



PITTSBURGH ACADEMY OF MEDICINE

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A
DICTIONARY
OF
PRACTICAL MEDICINE:

COMPRISING
GENERAL PATHOLOGY,
THE NATURE AND TREATMENT OF DISEASES, MORBID STRUCTURES,
AND THE DISORDERS ESPECIALLY INCIDENTAL TO CLIMATES, TO THE SEX,
AND TO THE DIFFERENT EPOCHS OF LIFE;

WITH
NUMEROUS PRESCRIPTIONS FOR THE MEDICINES RECOMMENDED,
A CLASSIFICATION OF DISEASES ACCORDING TO PATHOLOGICAL PRIN-
CIPLES, A COPIOUS BIBLIOGRAPHY, WITH REFERENCES;

AND AN
Appendix of Approved Formulae:

THE WHOLE FORMING A LIBRARY OF PATHOLOGY AND PRACTICAL MEDICINE,
AND A DIGEST OF MEDICAL LITERATURE.

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The skin was hot and dry, the pulse frequent, full, and hard. These symptoms gradually subsided, and she recovered, although the pain in the head and epigastrium continued long. (*Lond. Med. Gaz.*, xiv., p. 488.)

462. *b.* The morbid appearances produced by the salts of baryta have not been described as they occur in man. In the lower animals the mucous membrane of the stomach is usually found of a deep-red colour, unless death has taken place very rapidly, and in this case the alimentary canal is healthy. In all the animals which in Dr. CAMPBELL'S experiments were killed by the chloride applied to wounds, the brain and its membranes were much injected with blood; and in one of them the appearances were those of congestive apoplexy.

463. *c.* The Treatment of poisoning by the salts of baryta consists chiefly in the speedy administration of an alkaline or earthy sulphate, as the sulphate of soda or of magnesia. The poison is thus converted into the insoluble sulphate of baryta, which, if not altogether inert, is nearly so. But the alkaline sulphates are of but little service where the carbonate of baryta has been taken, unless in procuring the more rapid discharge of the poison by the bowels. In Dr. WILSON'S case, just mentioned, the copious evacuations from the bowels consequent on the exhibition of the sulphates were evidently beneficial, and tended to the recovery of the patient. Unless the patient be seen early, any treatment will prove inefficacious. Where the carbonate of baryta has been taken, Mr. TAYLOR recommends recourse to emetics and the stomach-pump; or, as chemical antidotes, a mixture of vinegar with an alkaline sulphate.

464. *C. COPPER, THE PREPARATIONS AND COMPOUNDS OF,* have been considered above (§ 205, *et seq.*) with reference to the corrosive and acute action of these substances when administered in large doses or quantities. But in smaller quantities, or in repeated doses, they act locally as irritants of the gastro-intestinal villous surface, and constitutionally as sedatives or paralyzers of nervous and vital power; this latter effect resulting both from the influence primarily produced by them upon the nervous systems, and from their operation, through the medium of the circulation, upon the heart and nervous centres. The cupreous compounds are most likely to act in this way, and in a chronic form, when they contaminate articles of food, as remarked on many occasions. The salts of copper, which are the most frequently administered in large doses for the purposes of suicide and murder, are the *sulphate* and *subacetate*, and these act chiefly as corrosive acute poisons, as stated above (§ 205). But these, as well as the other compounds of this metal, may be so employed or administered as to produce the symptoms most characteristic of *acro-sedative* poisoning.—*a.* In most instances the gastric symptoms are similar to, but not so severe as, those attending the corrosive operation of the poison, while the nervous symptoms are of longer duration. There are generally burning pain in the throat and stomach, anxiety, vomitings, acute pains and great swelling of the abdomen, but no diarrhoea; afterward painful and difficult deglutition, with swelling of the throat and face, oppression of the pulse, salivation and ulceration of the gums, spasms, convulsions, or

paralysis, sometimes jaundice, &c. The irritability of the stomach and cramps, or paralysis, often continue long, and are attended by costiveness and dysuria or suppression of urine.

465. *b.* The *sub-chloride of copper*, oxychloride or Brunswick green, is sometimes formed when common salt has been used in a copper vessel, and in this way, as well as when employed as a pigment, it has given rise to accidental poisoning. A boy of three years swallowed about a scruple of this salt. Vomiting and coldness of the extremities followed, and continued until death. On dissection there was no change indicative of the action of an irritant poison, excepting slight congestion of the vessels of the brain.

466. *c.* Copper vessels are acted upon by articles of food or drink, especially if these articles contain saline substances or acids, or become acid while kept in these vessels. Thus wines which are more or less acid, substances containing vinegar, or any other acid, soups or broths, especially if they contain vegetable matters, and are liable to become acid, and fatty substances, when kept only for a short time in copper utensils, are not infrequently productive of accidental poisoning. FALCONER and others have shown that metallic copper undergoes no change by contact with water unless air be present, when a hydrated carbonate, mixed with oxide, is formed. When an acid, or an oily or fatty matter, is in contact with the metal, then this change more rapidly takes place, and the liquid or fat acquires a green hue. Hence no acid, oily, or saline liquid should be prepared or kept in copper vessels. Nor should fruits, pickles, or preserves be either kept or prepared in them. The quantity of the poison which may be formed in these circumstances may not be sufficient to produce fatal poisoning, but they may be quite enough to cause severe gastro-nervous or acro-sedative effects. GMELIN was consulted respecting a violent disease which prevailed among a whole brotherhood of monks. The symptoms were obstinate and severe colic, retching and bilious vomiting, flatus, costiveness, burning pain in the pit of the stomach, under the sternum, in the region of the kidneys and extremities, with paralytic weakness of the arms. He found, on inquiry, that all the kitchen vessels—the pots, pans, milk pail, and butter dishes—were made of copper. Similar instances of culinary poisoning have been mentioned by CHRISTISON and other writers.

467. *d.* It is stated by Mr. TAYLOR, that the use of the alloy called *German silver*, which is a sort of *white brass*, consisting of copper, zinc, and nickel, and containing about 50 per cent. of copper, may be productive of acro-sedative poisoning where articles, as spoons, made of this alloy, are allowed to remain in contact with acid, oily, fatty, or saline substances. A lady in Paris, in 1838, after having had eels for dinner, was awakened in the night by headache, nausea, followed by vomiting and colic. Her physician ascertained that the eels had been cooked with butter and vinegar in an earthenware vessel; and he found the spoon, which was of German silver, presenting on different parts greenish spots. Chemical analysis showed that a poisonous salt of copper had been thus produced; and the fact was farther proved by

polishing the spoon and placing it in a similar mixture. Half an hour afterward green spots were perceived on the spoon, and in twelve hours it was quite green, as well as the butter in contact with it.

468. *c. Arsenite of copper, or SCHEELÉ'S Green*, being extensively used as a pigment, both in the arts and in confectionery, has occasioned dangerous effects. Dr. GREGGIAN informed Mr. TAYLOR, that fourteen children in Dublin, in 1842, suffered symptoms of poisoning owing to their having eaten confectionary ornaments coloured with this substance; and jaundice followed in two or three of those cases. Three lives were nearly sacrificed at a school near Manchester by the same cause: they suffered from violent vomiting, severe pains in the stomach and bowels, and spasms of the extremities.

469. The green colour of the matters vomited, in cases of poisoning by the cupreous compounds, has been mistaken by some for bilious vomiting. But this colour is generally owing to the poison, and not to the presence of bile in the vomited matters; for the bile is generally obstructed, and the liver and intestines more or less paralyzed by the influence of the poison on the organic nerves, as shown by the jaundice, and by the flatulent and colicky distention of the abdomen in these cases.

470. *f. The modus operandi of the cupreous compounds* appear to vary with the preparation, with the quantity swallowed, and the state of the stomach at the time, as respects especially the quantity and nature of the contents of this viscus. They certainly produce, as shown above (§ 207), a corrosive action on this organ when taken in large quantities, and in other circumstances favourable to that action; while, in other cases, this action is but slight, the fatal issue chiefly resulting from the change produced by them in the nervous system. Their organic action, or the disorganization produced by them locally, is mainly owing to their chemical combination with the albumen, or with one or more of the animal tissues. They evidently, also, affect the nerves of the part with which they come in contact, altering the innervation of the surface or viscus. They are also more or less imbibed by the surfaces and tissues, and carried into the circulation, thereby farther depressing and otherwise changing the irritability and innervation of the structures, the poisonous action of the cupreous salts being produced in this way chiefly, especially when given in repeated doses, or applied to a wound, as shown by the absence of corrosive or other local effects, and by the fact of these salts having been detected in the blood and viscera of animals poisoned by them. Dr. DUNCAN found that the application of the sulphate to a wound produced death in twenty-two hours, and yet the body appeared everywhere in a healthy state; but SMITH and ORFILA state that the acetate applied to wounds caused only local inflammation.

471. *g. The diagnosis of cupreous poisoning* is of some importance, seeing that the symptoms caused by it closely resemble those produced by arsenic and corrosive sublimate. According to ORFILA, the first symptom occasioned by the compounds or salts of copper is violent headache, which is followed by vomiting and cutting pain in the bowels, and by cramps and

pains in the legs and thighs. Generally there is a coppery taste in the mouth and throat, and an aversion from the smell of copper. Jaundice is a common symptom, and is never observed in poisoning by arsenic or sublimate. Fatal cases terminate with palsy, insensibility, and convulsions. This order of the symptoms is, however, by no means generally observed; for the headache often does not appear until after the vomiting; and the paralytic state, either of the sensibility or the power of motion, is often early. The chief diagnostic signs on which any reliance can be placed, are the coppery taste of the mouth, with a peculiar astringency and watering of the throat, with ulceration in the more chronic cases; vomitings and eructations of greenish, or greenish-blue matters, and frequently jaundice, or slight yellowness of the surface, which, however, does not appear in some cases until after death.

472. Cupreous substances, when taken in minute quantities for a long time, or when used by workmen who are inattentive to cleanliness, according to the observations of PATISSIER, MORAT, and others, are productive of a greenish sallow hue of the countenance; of an infirm and decrepit state of the body; and of severe attacks of colic, with partial or slight palsy; the children of persons thus rendered infirm being rickety and puny.

473. *h. The appearances on dissection of fatal cases* are most varied and uncertain. In some, the corrosive action of the poison already described (§ 207) is the most remarkable, especially in the stomach and duodenum. In others, equally or even more rapidly fatal, little or no structural change of these viscera is observed; nor even inflammatory appearances of the stomach and bowels are met with. In the majority of instances, however, the alimentary canal is more or less inflamed; and it very commonly presents a greenish hue, especially the stomach, œsophagus, and duodenum. The external surface is generally jaundiced or slightly yellow. The blood is of a dark hue, and fluid in some cases, and coagulated in others. The lungs and the sinuses of the brain are more or less congested; and the brain is sometimes more vascular than usual.

474. *i. The Treatment of the slow or acro-sedative form of poisoning by cupreous substances* should be based chiefly on the method stated above (§ 208, *et seq.*). After the evacuation of the poisonous substances as there advised, albuminous and saccharine substances should be given, and irritability of the stomach ought to be quieted, as it tends remarkably to lower the depressed vitality of the frame, by opium conjoined with camphor and creasote, and by external derivatives applied over the epigastric region. If inflammatory action be manifested, the usual local and general measures indicated by the state and associations of this condition ought to be prescribed.

475. *D. SALTS OF POTASH.—a. Chromate of Potash.—Chrome—Bi-chromate of Potash.*—This salt is extensively used in dyeing; yet poisoning by it is rare; but instances have been recently recorded. A concentrated solution of it causes all the symptoms and structural changes of corrosive poisons. In small doses it occasions vomiting, diarrhœa, paralysis, and death in the course of some hours. It appears to be

more or less absorbed, and to depress and otherwise affect nervous and vital power. In a case described by Mr. Wilson, of Leeds (*Lond. Med. Gaz.*, vol. xxxiii., p. 734), where a large quantity of this poison had been taken, the poisoned person not having been seen until soon after death, the countenance was pale, placid, and composed; the eyes and mouth closed; the pupils dilated; no marks of vomiting or diarrhoea, nor discharge from any of the outlets of the body, nor any stain upon his hands or person, or upon the bed linen, or furniture, could be detected. On dissection, a pint of turbid, inky fluid was found in the stomach. The mucous membrane of this organ was red and very vascular, particularly about the cardiac orifice. The brain, its membranes, and all the other viscera were quite healthy. The contents of the stomach furnished the chromate on analysis. In this case the chrome produced neither vomiting nor purging, and did not act by any irritating influence; but by its sedative action entirely. Hence it may be viewed as causing, according to the dose, state of the stomach, and other circumstances, either a decided corrosive effect, or an acro-sedative action, or even a purely sedative or fatally depressing operation. The treatment appropriate to poisoning with this salt is recourse to emetics or the stomach-pump, and to the administration of magnesia or chalk, mixed in water.

476. *b. Nitrate of Potass.*—TARTRA denies that this salt possesses any poisonous properties; and it is stated to have been given, for medicinal purposes, in doses varying from six to twelve or even sixteen drachms in the twenty-four hours. (*Med. Chirurg. Rev.*, April, 1844, p. 549) As it is much employed in the arts, accidents occasionally occur from it; and, in a large dose, as when taken in mistake for some purging salt, serious or even fatal results may be produced by it, although its effects are somewhat uncertain. Two men swallowed each one ounce of nitre by mistake for GLAUBER'S salt, and almost instantly experienced a sense of coldness in the course of the spine, trembling in the limbs, with vomiting and purging; the stools were bloody. They recovered in the course of a few days. In another case recorded in the same work, an ounce of nitre was fatal in thirty-six hours. (*CASPER'S Wochenschrift*, b. xviii., 1841.)

477. The symptoms and structural lesions produced by a poisonous dose of this salt will appear from the following details: M. ORFILA states that a lady took an ounce of nitre by mistake, and in a quarter of an hour suffered nausea, vomiting, and purging; and the muscles of the face were convulsed, the pulse weak, respiration laborious, and the extremities cold; but there was a burning pain in the epigastrium. She died three hours after taking the salt. On dissection, the stomach was found inflamed and the villous coat detached in places. Near the pylorus the inflammation approached to gangrene. A large quantity of fluid, coloured with blood, was found in the stomach. Dr. GEOFFRAN communicated to Mr. TAYLOR the following case: A man took, by mistake for salts, from an ounce to an ounce and a half of nitre. Severe pain in the stomach followed, with violent vomiting, but no purging. He died in about two hours after taking the salt. On examination, a

bloody mucus was found in the stomach; the villous coat was of a brownish-red colour, generally inflamed, and detached from the adjacent coat in places. None of the poison was detected in the stomach; but its nature was determined by the analysis of the portion left in the vessel from which it was taken. It is evident that the rapidity of the fatal result in this case was owing to the extent of the local injury, to the shock sustained by the constitution, and to the absorption, in a very short period, of so large a quantity of the salt into the circulation; this salt being rapidly absorbed, especially in solution, and acting not merely as an irritant, but also as a powerful sedative.

478. *c. Sulphate of potass*, according to Mr. MOWBRAY (*Med. Gaz.*, vol. xxxviii., p. 54), is much employed in France as a popular abortive, and when thus administered has proved not infrequently poisonous. It has also been employed in this country with the same object, and in one case, at least, with the same results, as shown by Mr. TAYLOR. In one case two drachms acted most powerfully, and in another four drachms, administered to a lady after her confinement, acted as an irritant poison. Another lady took, about a week after her delivery, about ten drachms of this salt, in divided doses, as an aperient. After the first dose she was seized with severe pain in the stomach, with nausea, vomiting, purging, and cramps in the extremities. These symptoms became augmented after each dose, and she died in two hours. On inspection, the villous surface of the stomach and intestines was found pale, except the valvulae conniventes, which were reddened. The stomach contained much reddish liquid, which was found to contain only sulphate of potass.

479. *d. Oxalate of Potass.*—Salt of Sorrel.—*Bin-oxalate of potass* is an active poison, owing chiefly to the oxalic acid. It is much employed under the name of "essential salt of lemons," and instances of poisoning have occurred from its having been taken by mistake, some of which have been adduced by Mr. TAYLOR. The following case is recorded by Mr. JACKSON: A female, aged 20, took about an ounce of this salt in solution. About an hour and a half afterward she was found on the floor quite faint, having been very sick. The nature of the poison was soon ascertained, and four ounces of *mistura cretæ* were administered. She was then in a state of extreme depression; the pulse could hardly be felt; the skin was cold and clammy; the lips and face were pale, and rigours continually affected the whole body. She complained of a scalding sensation in the throat and stomach, of pain in the back, of soreness of the eyes and dimness of vision. The conjunctivæ were injected and the pupils dilated. She was wrapped in warm blankets; ether, tincture of opium and camphor were administered, and reaction took place. The patient afterward recovered. Most probably the greatest part of the salt had been thrown off the stomach before she was found. The treatment of this case throughout was as judicious as successful.—(*Med. Gaz.*, vol. xxvii., p. 480.)—A lady, recently confined, took by mistake an ounce of this salt. She had scarcely swallowed the dose when she was seized with violent pain in the abdomen and convulsions; she died in eight

minutes. The mucous membrane of the stomach and small intestines was found inflamed. A tea-spoonful of this salt was taken for three successive mornings, and produced severe vomiting; about an hour after the third dose the patient expired. There was no examination of the body. It is evident from these cases, that this salt is a powerful acro-sedative poison, its depressing operation being most energetic.

479*. *e. Bi-tartrate of Potass.*—*Cream of tartar* is a most useful medicine, even in large doses; but it may be poisonous if a too large quantity be given. I have prescribed as much as two drachms three times in the day, in cases of dropsy connected with obstruction in the liver, with great benefit; but this dose should not be continued long, and its effects should always be carefully watched. Mr. TAYLOR states, on the authority of Mr. TVSON, that a man took four or five table-spoonfuls of cream of tartar, and was seized with violent vomiting and purging, with pain in the abdomen, thirst, feebleness of pulse, and a paralyzed state of the thighs and legs. The fluid vomited was of a dark-green colour, and the motions had the appearance of coffee-grounds. Death took place in forty-eight hours, and, on inspection, the villous coat of the stomach and duodenum was found highly inflamed; the cardiac portion of the stomach being of a deep-red colour, with spots of black extravasation. This organ contained a thick, brown fluid, coloured by bile. The intestinal canal was more or less inflamed.

480. *f. The nitrate of soda, the sulphate of magnesia, the biborate of soda, the chloride of sodium, and other salts,* which are harmless in small or moderate quantities, are injurious, and act as irritants and depressants when taken in large or excessive doses, especially in states of disease or of constitution which are favourable to their injurious operation.

481. vii. THE SULPHURETS OF POTASSIUM AND SODIUM.—*The alkaline sulphurets* have very rarely occasioned poisoning in this country; but they have caused fatal accidents in France, where they are frequently employed for baths and for the manufacture of artificial sulphureous waters. They act as powerful irritants of the digestive mucous surface and depressants of nervous and vital power, exhausting at the same time the irritability of contractile tissues. These latter effects are in great measure owing to their absorption into the circulation. M. ORFILA and M. CAYOL have recorded cases of poisoning by these sulphurets. The quantity taken in each of these was three drachms and upward. Two of the cases terminated fatally in less than fifteen minutes; the other patients who recovered were dangerously ill for some days. The rapidly fatal effects of these poisons were probably owing more to the change produced by them in the state of organic nervous influence, than to disorganization of the villous coat of the stomach.

482. *a. The symptoms* in these cases were burning pain and constriction in the throat, gullet, and stomach; frequent vomiting; at first sulphureous, the air of the chamber being tainted with the odour of sulphureted hydrogen, and afterward sanguinolent; purging, at first sulphureous, afterward mucous and bloody; sulphureous exhalations from the mouth; acid

taste on the palate; pulse quick, afterward feeble, fluttering, and almost imperceptible; followed, in the cases which recovered, by inflammatory reaction of the digestive canal, extending to the œsophagus; and by mortal faintness and convulsions in the fatal cases.

483. *b. The structural changes* in the fatal instances were great lividity of the face and extremities, and loss of the muscular contractility immediately after death. The stomach was red internally, and lined with a crust of sulphur. The duodenum was also red. The lungs were soft, gorged with black fluid blood, and did not crepitate.

484. *c. The Treatment* seems to consist in the instant administration of any diluent at hand, and frequent doses of common salt. If inflammation of the stomach, &c., supervene, local and general antiphlogistic measures and external derivatives will be required. Dr. CHRISTISON observes, that the chloride of soda may be called the antidote against this poison, as it decomposes the sulphureted hydrogen which is evolved, the rapid disengagement of which he considers to be the cause of death in the quickly fatal cases. The chloride of lime is equally efficacious with the chloride of soda.

485. viii. TARTARIC ACID.—Oxalic acid in small doses, and tartaric acid in large quantities, are productive of nearly similar effects. *Tartaric acid* has, until lately, been regarded as not poisonous; but an instance lately occurred of this acid having been given to a man instead of aperient salts, in the dose of one ounce, with fatal effect. The whole of this was swallowed at once, dissolved in warm water. He immediately exclaimed that he was poisoned, complained of a burning pain in the throat and stomach, and compared the sensation to that of being all on fire. Soda and magnesia were administered with diluent drinks. Vomiting commenced, and continued until his death, which took place nine days afterward. Tartaric acid was found in the dregs of the cup, and the person who made the mistake admitted the act and the substance which he had thus given. On inspection of the body, nearly the whole of the alimentary canal was found inflamed. (See TAYLOR, in *Op. cit.*, p. 104.)

486. *The Treatment* of poisoning with this acid is the same as that for *oxalic acid* (§ 166), which, when given in smaller quantities than those usually productive of the corrosive action described above (§ 160, *et seq.*), is partially absorbed, and, with its local irritating operation, occasions also marked depressing and paralyzing effects; and either an acute, or sub-acute, or chronic form of poisoning, according to the quantity taken, the circumstances of the case, and the treatment employed soon after its ingestion. In the slower form of poisoning by *oxalic acid*, as well as that by *tartaric acid*, as soon as the poison is removed by vomiting or the stomach-pump, remedial measures should not be confined to the removal of the local irritation merely that is produced by it, but ought to be extended to the restoration of the nervous and vital powers, which are more or less depressed by the influence of the poison on the nerves of the alimentary canal, and, by absorption, upon the heart, nervous centres, and constitution generally; and with these intentions the means already recommended for the more

energetic acro-sedatives will be found the most successful for the removal of the consecutive effects, and for the slower forms of poisoning caused by small doses of oxalic acid, and by large quantities of tartaric acid.

487. ix. THE NECROSCOPIC POISON.—POISON IMBIBED FROM RECENTLY DEAD BODIES.—*A. Source and Nature of the Poison.*—The fluids of bodies recently dead, or that have not passed into an early stage of decomposition, not infrequently produce the most dangerous effects, especially when they come in contact with an abraded surface, or are inoculated in any way. The effects vary with the disease of which the person died, with the constitution of the infected individual, and with other circumstances. I have had several occasions of observing and treating the effects of this species of animal poison. Since I first published my views as to the nature and treatment of these effects, in 1823, and again in 1833, I have been more fully convinced of the accuracy of these views; and, moreover, they have received the support of experienced observers, and especially of Mr. TRAVERS, in more recent publications. The poisonous action of the fluids of dead bodies is most acutely exerted when these fluids are inoculated; but they sometimes act upon the perfectly sound skin, there being no scratch, puncture, or abrasion through which they could be introduced, the existence of either of these greatly facilitating and aggravating their operation. In the observations I offered respecting this poison (in the *London Medical Repository for July, 1823*), I stated, 1st. That this poison is distinct from any other animal poison, generated or transmitted during life; 2d. That it is different, in its nature and effects, from putrid animal matter; 3d. That it does not appear to exist in the blood, either during life or after death; 4th. That it is produced during the changes which are more immediately consequent upon the loss of life; and, 5th. That it is present chiefly in the secreted and exhaled fluids on the surface of membranes, especially serous membranes, or in cellular or parenchymatous parts. I then remarked that, as respects the distemper inoculated from another body which has recently ceased to live, and as regards the nature of the animal poison which causes the distemper, and the manner of its operation, it may be inferred that it is produced by the textures before their vital properties and cohesions are quite extinct, because putrid animal matters occasion different and less dangerous effects; that as all morbid poisons possess certain properties bestowed on them by the organic nervous or vital influence of the vessels and structures secreting them, in consequence of previous disease, either of these parts or of the frame generally, which properties they preserve for a time until the elementary particles composing them enter into different combinations, so may the secretions and fluid exhalations occasionally experience, during the period in which organic nervous influence and vitality are forsaking the tissues which secrete them, such a change as amounts to the acquisition of virulently poisonous properties, and that these fluids, thus changed, affect the nerves of the part to which they are applied, and, consecutively, the whole frame, the cellular tissue in the vicinity of the glands above the seat of inoculation generally evincing

more or less disorganization, and sometimes, also, the integuments, the fasciæ and tendinous sheaths, the absorbents, or veins, or both, and even the serous surfaces of adjoining cavities. This poison being productive of the most dangerous effects, and on numerous occasions, it is of the utmost importance, especially to medical men themselves, that its operation, and its counteraction and treatment, should be carefully investigated.

488. a. The poison communicated by recently dead bodies has been described, and illustrated by the details of cases, by Dr. DUNCAN, as constituting a form of diffusive inflammation of the cellular tissue, and by Mr. TRAVERS, as occasioning a variety of constitutional irritation. But the doctrine inferred from these denominations is too restricted to be applicable to the distemper which this poison develops. Diffusive inflammation of the cellular tissue certainly often exists as a consequence of the contamination produced by the poison; but it is preceded and attended by constitutional effects—by states of the circulation and nervous system—of the most malignant or virulent description. Constitutional irritation is equally present, and is certainly more or less immediately consequent upon the local irritation, impression, or alteration, or whatever the local effect may be; but so are depression of organic and cerebro-spinal nervous power, changes in the states of vascular action and of the blood, asthenic inflammation of the cellular tissue, and often, also, of the integuments, or of the absorbents or veins, or of adjoining serous surfaces. The truth is, that this poison produces an almost specific effect upon the tissues in the vicinity of glands above the seat of its application; but this effect may be limited to the cellular tissue, or extended to several other tissues; and it may be confined to the axilla, or extended to more deep-seated parts; it may not implicate, in a visible manner, any of the structures of the arm, although the poison was inoculated in the finger, and the cellular tissue in the axilla is most extensively diseased, no change between these situations being detected; and it may most virulently affect the nervous and vascular systems, and depress vital power and resistance, when the local changes are the least extensive or apparent.

489. b. It is of some moment to know the *dis-eases which impart this poisonous property* to the recently dead body; but, as to this, we have no precise information. Although the distemper which is the result has most frequently been produced by the inoculation of the fluids of bodies which had died of inflammations of serous surfaces, or of erysipelas, or of puerperal diseases, yet has it occurred also after the inoculation of the fluids of bodies which have died of other visceral or inflammatory maladies—of enteritis, peritonitis, &c. More than one person has even been infected by the same dead body, this occurrence evincing a greater virulence of the poison in that body, owing either to the nature of the disease of which it died, or to the period after death at which the examination was made. That this has probably depended chiefly upon the former of these causes may be inferred from its frequent occurrence when the body has died of erysipelas, puerperal peritonitis, or other states of puerperal fever; while, on the other

hand, there is equal, if not stronger, reason to believe that the poison imbibed in dissection is not the result of diseased action, simple or specific, in the living subject, but is altogether generated immediately after death, although certain diseases may favor its generation at this period. That the poison is not the result of the disease of which the patient died, is shown by the facts, 1st. That this poison has been imbibed during the examination of bodies of persons who have died suddenly, and in health, in consequence of accidents; that poisonous effects have been produced by the fluids of a body which has been killed by an accident, or has died of a non-contagious disease; 2d. That the distemper developed by this poison presents a specific character, differing only in the degree of severity and the extent of the contingent local inflammation, whatever may have been the malady of which the subject which furnished the poison died. Still, the larger proportion of cases of this distemper have their origin from the fluids of bodies recently dead from inflammations, by which an abundant exudation of morbid fluids is accumulated, and in which the thoracic and abdominal viscera are examined and handled. In most instances which have fallen under my observation, the bodies from which the poison was imbibed were still warm when examined, and many of them had died of puerperal diseases. Mr. TRAVERS remarks, also, that the subjects were recent. Not one had been buried; some were yet warm. Even of those in which demonstration, not inspection, was the object, the bodies were in a perfectly fresh state; and he remarks a circumstance, which has also struck me, namely, that when the dissection has been performed before the body has entirely parted with its warmth, a faint and peculiarly oppressive odour is emitted, which is disagreeable, not to say revolting, even to persons habituated to dissection, and which not infrequently creates nausea.

490. *c.* The question may be asked, Whether or not the poisonous fluid may produce its effects when applied to the *perfectly whole cutaneous surface*, or only when this surface is punctured, or the cuticle abraded, in the part which comes in contact with it? I can answer this question in the affirmative from my own experience, and from statements made to me by others in the frequent habit of making inspections. I have seen severe constitutional disorder of the specific kind produced by this poison in two instances, in which the subjects had died of puerperal disease, the surgeons who assisted me in the examinations, and who thus imbibed the poison, having had no abrasion of the cuticle whatever. The fluids accumulated in the serous cavities occasioned, in these two instances, a sensible smarting over the surfaces with which they remained for a time in contact. But I believe that such instances are rare compared with those which are owing to some scratch, abrasion, or puncture of the cuticle.*

491. *d.* Another question suggests itself, namely, *Whether or no this poison is the same as the infectious emanation which caused the disease of which the person died; is allied to a specific contagion existing still in the body which has died in consequence of it?* We know that the poison under consideration is frequently imbibed from bodies which have died from puerperal diseases, from visceral inflammations, from erysipelatos and other maladies. But the distemper produced by this poison is not in any respect the same as any of these diseases, there being no farther resemblance than in the febrile disturbance present in all of them, and in the vital depression and weak state of vital resistance. That small-pox, syphilis, erysipelas, glanders, and even scarlet fever may be transmitted by the recently dead body; and that the power of transmitting these specific contagions may be retained by the bodies which have died of them for a considerable but an indefinite time, I believe; but when the body is surrounded by clothes of any kind, this power of transmission is retained by the clothes rather than by the body itself; for, as soon as the latter undergoes decomposition, the power of transmitting the specific malady which caused death appears to have ceased, especially if there be a free admission of atmospheric air, because the contagious secretions are also decomposed, and, by their decomposition, have lost their specific and poisonous properties. It cannot, however, be inferred that the distemper produced by the poison imbibed from recently dead bodies is allied to any of the maladies which has most frequently caused the deaths of the bodies from which the poison was imbibed.

492. *B. Symptoms.*—(*a*) In some cases, the following is the usual procession of morbid phenomena. 1. A few hours after puncturing a

the finger up the arm, along the neck, to the tip of the ear. Matter formed within the proper sheath of the flexor tendon of the finger, and the wound in the finger continued to discharge freely after the sheath was laid open. Delirium, rapid pulse, &c., continued, and was followed by rigours and profuse colligative sweating, and soon afterward by extreme depression, and death. 2d Case. The maid-servant who fomented this woman's hand, on the third day after the incision of the finger, complained of pain and tension of the point of the fore-finger of the right hand, with constitutional disturbance and delirium. She had neither wound nor scratch of any kind. Acute fascial inflammation of all the fingers, back of the hand and fore-arm, followed, and abscesses formed, requiring free incisions. 3d Case. A laundress, who washed the sheets taken from the bed of the first of these patients shortly before her death, "had no sooner opened and immersed them in water, than she was overpowered by an effluvia, which she described as peculiarly offensive, and instantly complained of a most severe darting pain in the axilla and shoulder. Nausea and faintness followed, and in the evening she had a rigour which lasted three hours. In the morning she was much fevered, and on the two succeeding nights violently delirious. The pain she now complained of affected the outer side of the upper arm, from the elbow to the shoulder, but there was neither redness nor swelling of this part." Afterward the pain shifted to the axilla and pectoral region, and two days afterward a deep pectoral abscess presented itself. She ultimately recovered. In neither of the second or third cases was there any breach of the cuticle, by which absorption of, or contamination by, a poisonous fluid could be facilitated. Mr. TRAVERS adds, that the laundress was attacked at the one and the same instant with nausea and faintness from the stench, and with acute lancinating pain from handling the linen; and that a woman who was present informed him that the laundress turned as pale as death, and exclaimed with agony, from the pain she felt in the arm within two minutes of unfolding the sheets. I quite agree with this very able surgeon in remarking that this was surely the operation of a subtle poison on the nervous system, as it is only through this medium that it could operate so instantaneously.

* The following cases, abridged from Mr. TRAVERS'S work, are remarkable, as they are examples of a distemper, in the local and constitutional symptoms, closely akin to, if not actually identical with, that produced by the poison imbibed from recently dead bodies, although the poison, in the second and third cases, was imbibed from the secretions of the first case while she still lived. 1st Case. A female, while suckling, had a poisoned wound of the finger, followed by pain, fever, and delirium. The pain extended from

finger in the examination of a body, pain is felt in the puncture. It soon increases to the utmost agony, and is attended by symptoms of constitutional irritation, the nervous system being agitated to a violent degree. No trace of inflammation beyond slight redness of the puncture is observable; and no evidence of inflammation of the absorbents or veins can be detected. In a case recorded by Mr. TRAVERS, death took place forty hours after the puncture was received, with all the symptoms of agonizing excitation of the nervous system, the distemper resembling hydrophobia. 2. In other cases, the puncture is also not attended by any evidence of inflammation, but, in ten or twelve hours afterward, feelings of indisposition are complained of; violent rigours are soon experienced, followed by febrile reaction, nausea, or vomiting, and most rapid pulse. Severe pain is felt about the shoulder, axilla, or pectoral muscle; but no trace of inflammation can be detected between the puncture, generally of a finger, and the seat of pain. Anxiety, depression of spirits, delirium, profuse perspiration, singultus, most rapid and small pulse, insensibility, and death supervene. 3. In some instances, from ten or twelve to twenty-four hours after the imbibition of the poison, languor, depression, shivering, and sickness at stomach are experienced; a *vesicle*, or *pustule* resembling that of smallpox, is observed in the punctured or abraded part, and pain is felt in the shoulder or axilla, or both, but without any sign of inflammation of the lymphatics, or of any other tissue of the arm. The pain extends to the breast of the same side, and is attended by nervous excitement, thirst, watchfulness, headache, a hot and dry skin, a frequent and weak pulse, afterward by delirium, irritability of stomach, by swelling or redness about the axilla or pectoral muscle, by sinking of the powers of life, and often by death. 4. In other cases, no vesicle or pustule forms in the seat of puncture, but severe constitutional symptoms are rapidly developed; the pulse in a day or two rises to 120 or 130; delirium soon appears; slight swelling and excruciating pain affect the axilla and breast, attended by diffuse swelling, patches of colour, and severe pain in different and distant parts of the body, by nausea and vomiting, by singultus, and sometimes by yellowness of the conjunctiva and skin; followed by a weak, small, and rapid pulse, exhaustion, laborious breathing, and death. 5. In all the preceding *phases* of this distressing distemper, the puncture or abrasion by which the poison was imbibed, and the tissues in the vicinity, have presented no alteration, excepting the superficial vesicle or pustule observed in some instances, and no local lesion or disorganization appears until after the constitutional symptoms have been fully developed, and then it takes place near or on the trunk, in the situations already mentioned. But, in another class of cases, the wound or puncture of the finger suppurates, not, however, until after severe constitutional symptoms have appeared, especially rigours, vomitings, pain in the axilla or shoulder, very rapid pulse, physical and mental depression, with white or loaded tongue, dry and hot skin, &c. The puncture or abrasion now begins to suppurate, and swelling extends along the finger and sometimes over the hand. Sphace-

lation of the cellular tissue, and often also of the tendinous structures, takes place; the pain in the axilla or shoulder is followed by diffused and slightly coloured swelling, extending sometimes to the integuments of the same side of the body. As the disease continues, headache, watchfulness, delirium, irritability of stomach, thirst, and singultus vary in severity; and, if no alleviation take place, these symptoms increase; the physical and mental exhaustion are extreme; restlessness, followed by insensibility and coma, appears, and death takes place after periods varying from four or five to twelve or fourteen days. 6. In other cases, a diffused swelling, tension, and redness affect the wounded finger, subsequently to the occurrence of severe rigours, prostration of strength, frequency of pulse, and other constitutional symptoms. The swelling, tension, and redness extend to the hand, or up the arm, upon which numerous vesicles form, followed by tumefaction, and insulated patches of colour on the shoulder, breast, and back, on the same side of the body. The febrile and the nervous symptoms continue to increase with the development of local lesions; and the pulse, strength, and constitutional powers generally become weaker, death taking place in the majority of cases after periods varying as just stated. 7. In some instances, after the appearance of rigour, fever, nervous and other general symptoms, the axilla becomes painful and swollen. Diffusive inflammation proceeds extensively from this part through the cellular tissue, extending in some cases to both sides, and suppurates or sloughs; inflammation of, and effusion into the pleura, often ultimately supervening. Death generally takes place in these cases with the usual symptoms, and after the indefinite period already mentioned.

493. From the above brief account of the *several phases* of this dreadful distemper, it may be inferred that the local inflammatory action is an unessential and subordinate feature of the disease in its severest forms; that the distemper actually consists of prostration of the nervous influence and vital energy generally, the local irritation arising from the impression or imbibition of the poison occasioning slight change of structure in some instances, and more extensive inflammation and disorganization in others, as already noticed, and as will be more fully described; and that the contamination produced by this poison is characterized by preternatural excitement of the nervous and vascular systems, without power or vital resistance, that soon passes into rapid exhaustion. A circumstance deserving of notice in this distemper is the remoteness of the local inflammation, in the great majority of instances, and in all its above phases, excepting the sixth, from the part at which the poison is imbibed; and the absence of any sign of inflammation of the absorbents or veins in a great proportion of the cases between the seat of injury and that of pain and inflammation. But this phenomenon is also remarked in other maladies produced by a specific animal poison, as syphilis. It would appear that this poison, whether conveyed by the absorbents or by the nerves, especially those supplying the blood-vessels, affects the glands of the axilla, and probably also the axillary plexuses of nerves, in an especial man-

ner, and that the surrounding cellular tissue becomes asthenically or diffusively inflamed in consequence, and the consecutive lesions are thereby produced.

494. *C. Prognosis.*—Much depends upon the severity of the constitutional symptoms at an early period of the distemper, and upon the treatment then adopted. Those cases in which the local affection is the least severe, and the nervous and febrile symptoms most prominent, are the most dangerous; and, if the disease be not arrested at an early stage by most decided means, these symptoms, and with them the local inflammation, rapidly increase and pass beyond the influence of any remedial means whatever.—*a.* The prognosis is generally most unfavourable when the irritability of the stomach extends to the diaphragm and is attended by hiccough; when the tongue becomes brown or dry, or both; when the pulse rises above 120 in a minute, and is weak or small; when anxiety and mental depression are great, the features sunk, or the extremities cold; when a lurid, dirty, cachectic, or yellowish hue of the countenance and general surface is observed, and more especially early in the distemper; when the individual has been previously out of health, is cachectic, or the subject of disease of the heart, or of a varicose state of the veins; and when delirium becomes continued, and is attended by unconscious evacuations. In these circumstances few or no hopes of recovery may be entertained; but, nevertheless, active measures, such as I shall recommend, should not be relinquished. If these symptoms be accompanied with signs of extensive local disorganization, the chances of recovery are diminished, owing to the probable absorption of morbid matter into the circulation. Still, energetic measures should be prescribed; but, unless these measures are of a powerfully restorative kind, they will be productive of no benefit, especially if hiccough be present; and even when most restorative, they may fail, or may not be retained on the stomach, particularly at a far advanced stage of the distemper.

495. *b.* A more favourable result may be anticipated if the pain is less violent, if the pulse becomes less frequent, and the delirium is only present at night. If sleep be obtained, if the tongue continue moist, if singultus be not present, and if medicines be retained on the stomach, more sanguine hopes of recovery may be entertained. As respects the local affection, much will depend upon the rapidity and extent of its progress under the integuments and muscles of the affected side; and the amount of ease obtained from incisions, and the discharge of purulent matter. If the discharge be followed by a limitation of mischief or disorganization, and if the inflammation of the deep-seated cellular tissue has not implicated the pleura, it may be hoped that such measures as assist vital resistance may still prove successful, not only by arresting, but also by remedying the already existing disorganization. Of eight cases which I have seen of this distemper, seven recovered; but all these came under my care at an early period. The fatal case occurred in a gentleman who was the subject of varicose veins, and was otherwise cachectic. I saw him shortly before his death, which took place after a short period from the imbibition of the poison

during the examination of a recently dead subject; the local symptoms in his case having been slight, but the nervous and constitutional disturbance most severe and rapidly fatal.

496. *D. Appearances after Death.*—These have been but imperfectly described, and comparatively few of the fatal cases have been examined. The lesions observed are, 1st. Those which are found in the external parts of the body; and, 2d. Those which are detected in the cavities and in the viscera.—(*a.*) In the former, the changes are in some instances very slight, or hardly appreciable, unless in the vicinity of the axillary glands, in others most extensive. These changes may consist of serous infiltration of the cellular tissue surrounding these glands, which are generally more or less enlarged or inflamed, or both, or of a sero-puriform, or puriform infiltration, with or without destruction of the cellular tissue itself, as described in the article on diffusive inflammation of the CELLULAR TISSUE (§ 20, *et seq.*). In some instances the disorganization proceeds so far between the pectoral and respiratory muscles as to implicate the pleura, the external surface of the *costal-pleura* being also inflamed. The *muscles* themselves are sometimes changed, especially in the vicinity of the sphacelated cellular tissue or of the collections of puriform matter; the muscular fibres being of a dirty yellow colour, and devoid of cohesion. The *veins* are sometimes implicated, but seldom to a great extent, unless those which pass through the inflamed and disorganized cellular tissue. The *absorbents* between the puncture and the axillary glands sometimes betray no change, neither the superficial nor the deep-seated. In some instances, these vessels appear thickened or enlarged, and are, in various places, surrounded by sero-puriform, or puriform collections, in small quantities, in the cellular tissue. The *arteries* of the limb are rarely altered, excepting the smaller branches, which either supply the disorganized cellular tissue, or which traverse it. The state of the *nerves* has not been accurately observed, or has been reported as not materially changed; but in one or two instances the nerves of the arm, especially the internal cutaneous nerve, have been found inflamed. The *aponeuroses*, the *fascia*, the *theceæ*, and the *tendons* have sometimes been found inflamed, or surrounded by, or covering, or containing puriform matter or pure pus. Lesions of one or more of these structures are chiefly seen in those cases which are noticed as constituting the fourth, fifth, sixth, and seventh phases of the distemper (§ 492); in many of those cases, which are ranked under the first, second, and third phases, these lesions, excepting those of the cellular tissue and axillary glands, are either wanting, or so slight as not to be remarked. The lesions of these several tissues are generally most remarkable when the limb and external parts in the vicinity of the axilla present the more evident signs of disease or disorganization; and the symptoms during life vary with the texture more especially implicated, as shown in the articles upon the diseases of these textures. In the majority of cases, and more especially when the poison has been imbibed from a very recent or warm subject, no alteration can be traced after death in the arm, or any connexion between the abrasion or punc-

ture of the finger and the changes existing in the vicinity of the axilla and pectoral muscles, more than could be observed during life.

497. (*b*) If the external alterations have been but superficially observed, the visceral changes consequent upon this poison have been still more imperfectly described, if, indeed, described at all. The most prominent lesions have been observed in the *pleura*, particularly in that of the affected side, when the diffuse inflammation of the cellular tissue and its consequences have extended to the *pleura*. In these cases the *pleura* is inflamed, generally throughout that side of the thorax, and the cavity contains a turbid serum, or a large quantity of bloody serum, with flakes of lymph floating in it. The inflammation extends from the costal to the diaphragmatic and the mediastinal *pleura*, and even to the pericardium, the pulmonary *pleura* being also inflamed. The *lungs* are rarely affected, but they have been found more or less congested. The *heart* has been seen somewhat flabby, and its right side and *vena cava* have presented inflammatory appearances. The stomach, intestines, liver, &c., are generally represented as natural, and the brain, spinal cord, and their membranes either have not been examined, or they are said to have been unaltered.

498. *E. Causes predisposing to Infection by this Poison.*—There are manifestly circumstances which predispose to the infection of this poison, and increase the virulence of the distemper produced by it. Attention to these causes may aid in preventing, or even in counteracting its effects. The operation of this, as well as of all animal poisons, is favoured by whatever lowers the powers of life or weakens the vital resistance to injurious agents; by the depressing emotions, by fear especially, by disordered states of the digestive organs, or by accumulations of secretions and faecal matters in the digestive canal; by a languid, impoverished, or an impure state of the circulating fluids; by general cachexia or anaemia; by fatigue, want of sleep, or exhaustion of nervous energy; by excesses of all kinds; and by an irritable and susceptible state of the nervous system. Probably also idiosyncrasy, the nervous and irritable temperaments, a debilitated state of the frame, or natural delicacy of constitution or conformation, favour the morbid impression of this poison, and impart a greater intensity to its effects. My experience has shown that these circumstances are influential in the way now stated; while their opposites are equally influential in resisting the operation of the poison, or in rendering the effects less dangerous.

499. *F. Nature of the Distemper.*—The constitutional symptoms are generally the same in all cases of this terrible malady, and differ merely in severity and the rapidity of their course. They always precede the more prominent local alterations, but become more severe with the progress of these. In addition to several other phenomena characteristic of this distemper, it is generally observed, in the more prolonged cases, that, previously to a termination in death or recovery, swelling and inflammation affect a portion of the limb interposed between the original wound and the first seat of pain. The swollen parts present a redness very unlike that of erysipelas; for the tint is that of peach-blossom, and is very small in ex-

tent compared with the extent of the swelling, and is seen for a very short time, perhaps for a few hours only, never longer than a few days, on the same spot, and next is observed in some distant part, possibly even on the opposite limb. Besides, this peculiar redness, vanishing quickly from a part, does not leave any vesication or desquamation after it, as is seen in cases of erysipelas. When the swollen parts are incised they yield only a small quantity of blood, or serum and blood, unless the incisions are delayed until the effused fluid assumes a puriform character. On this topic Dr. COLLES remarks, that this peculiar disease, the effect of slight wounds received in dissection, presents much less of inflammation of the wound or its vicinity than occurs in the various diseases to which slight injuries more frequently give rise. Here the injury seems to produce mischief by exciting a fever, which in its turn induces a swelling and redness of very peculiar character, although at length (if the patient chance to survive) it will end in inflammation and suppuration of the wounded limb. (*Dub. Hosp. Rep.*, vol. iv., p. 247.)

500. Having seen the inoculation of this poison so frequently during examinations of puerperal subjects, and of persons who had died of erysipelas, the question suggested itself: Can the distemper which results be merely a form of erysipelas produced by inoculation? But this idea was met by the fact that it has been caused by wounds or abrasions received in the examination of recent subjects, irrespective of the disease which produced death, although my experience has shown that these maladies, and inflammations of serous membranes attended by fluid effusion, have most frequently occasioned it. There still remains much to be ascertained respecting it, before accurate views as to its nature can be entertained; for the changes produced in the nervous systems and centres, the appearances of the blood, both during life and after death, and the possibility of propagating a similar distemper by the serous fluids of the body of one who has died of it, or by the secretions during life, have not been investigated. Strongly impressed with the imperfect state of our knowledge of the pathology of this distemper, owing chiefly to the very superficial examinations of the bodies of those who have died of it, and to the general adoption of a very injurious practice in the treatment of it—a practice which has proved unsuccessful in the great majority of cases for which it has been prescribed, and which is yet persisted in with little variation, I would, nevertheless, suggest the following views as to its nature, especially as they have been the basis on which I laid my indications of cure in the cases which were treated successfully.

501. *a.* The poison communicated by, or imbibed from, a recently dead human body is of a specific nature, and produces a specific malady; specific, more especially, as respects the constitutional symptoms, and peculiar, as just shown, as regards the consecutive pain and inflammation in the axilla, arm, and side.

502. *b.* This poison is connected with the secreted and exhaled fluids before they have undergone any change or decomposition, and before any of the properties imparted to them during life, or during the departing vitality of

the frame, has escaped from them; the loss during decomposition of properties derived from, or depending upon the state of vitality, rendering them inert. In these respects, as regards the source of morbid properties, and the loss of those properties, the fluids producing this peculiar malady in every respect resemble the fluids infecting small-pox, measles, scarlet fever, &c.; are identical with the infection of the exanthemata; decomposition or putrefaction destroying, while recent production increases, the poisonous properties.

503. *c.* There is every reason to infer, from facts already before the profession, that this poison exists, probably in various and varying grades of activity, in the serous and exhaled fluids of all human bodies recently dead, whether from accident or disease, and irrespective of the nature of the disease; but that certain maladies, especially those in which the serous membranes and the circulating fluids are most liable to be especially affected, as puerperal diseases, erysipelas, peritonitis, &c., appear, in the present state of our knowledge, to cause this distemper the most frequently.

504. *d.* We do not possess evidence of this infection being communicated by a person labouring under the effects of poison—by a living person;* and this may arise from the circumstance of the fluids which are more especially or specifically infectious or poisonous being those which exist in shut or serous cavities or in viscera, and which cannot hence be imbibed during life; although other fluids, exhalations or secretions, which are probably less poisonous or infectious, may communicate a modified or less virulent malady, as, indeed, seems to have been the case on some occasions, as noticed below.

505. *e.* The morbid impression made by the poisonous fluid imbibed from a recent subject, seems primarily to affect the nerves of sensation in connexion with those of organic life;

and, as these nerves are intimately associated with the vessels and absorbents of the limb, on the one hand, and with the ganglial system on the other, the morbid impression or irritation produced by the poison is followed by a general disturbance or tumult of all the functions actuated by the ganglial or the organic nervous system; by excessive vascular action, without nervous energy or vital resistance, these states passing into exhaustion, with sinking of vital power, and contamination of the circulating fluids.

506. *f.* The primary impression of this poison is not only irritating, and productive of exquisite pain, in many instances, and of inordinate excitement in most, but it is also of a depressing nature, inasmuch as it often is followed by a numbness in the vicinity of the puncture, or by aching, or feebleness of the limb; the local change thus primarily produced being probably a chief cause of the consecutive changes which take place, especially after the frame is infected, in the glands and other structures in the axilla and its vicinity of the inoculated side.

507. *g.* The constitutional commotion, generally developed from ten to twenty hours after the imbibition of the poison, is displayed by all the organs actuated by the ganglial system, and by the brain; both the organic and the cerebrospinal nervous systems evince much disorder, and this disorder is characterized by altered or excited sensibility, and by deficient energy; the functions of vital organs being co-ordinately affected, vascular action remarkably excited, and the blood, and all the secretions from it, ultimately more or less altered, as in malignant distempers.

508. *h.* The nature of the constitutional commotion, of the vascular excitement in this malady, has been misunderstood by most practitioners and writers, and the character of the pulse misinterpreted; and, because there have been very acute pain, and remarkable frequency of pulse, often with delirium, many have most unwarrantably inferred the existence of sthenic or true inflammatory action, instead of its opposite, and had recourse to large vascular depletions, which have aggravated the pain, increased the frequency and weakness of the pulse, and induced or rendered more severe and continued the delirium. Oh! that ignorance would be less presuming, and not actually inflict the death it is blindly attempting to prevent.

509. *i.* The state of predisposition of the poisoned person, depending upon temperament, constitution, and the existing health, is most probably influential in developing the primary impression and the consecutive effects, or in aggravating their severity. This has been proved by cases which have come under my own observation, where surgeons, who have aided me in the inspection of very recent bodies, have, without any wound or abrasion of the cuticle, or after such injury, complained only of comparatively slight constitutional symptoms, which yielded to treatment, without the local symptoms having appeared.

510. *k.* In most cases no morbid connexion can be traced between the puncture, or the point of inoculation, and the subsequent alterations which take place in the axilla and vicinity: no change is observed in any of the tissues

* Dr. NELSON states, in his account of the illness of Mr. NEWBY, who died from the effects of this poison, that Mr. N.'s assistant had an erysipelatous inflammation of the fauces, and the pupil an attack of low fever, during the latter part of Mr. NEWBY's illness; that the housemaid was severely affected with cynanche tonsillaris; that the nurse had a slight attack of pyrexia, with pain and stiffness at the back of the neck, followed by erysipelas, which proved fatal; and that another who assisted just after Mr. N.'s death had also erysipelas, but recovered. Dr. NELSON adds, "Was the disease which destroyed Mr. N. erysipelas produced by maculation and affecting the cellular substance of the breast and parts adjoining? Did the five cases which occurred during his disease and after his death arise from erysipelatous contagion?" (*Medical and Phys. Journ.*, Aug., 1823.)

Mr. DELPH, surgeon, imbibed this poison from a woman who had died a few hours previously of visceral inflammation, the body being still warm when it was examined. The woman who nursed this person and washed the linen was seized with fever. Mr. SMART, who assisted Mr. DELPH in this examination, was also attacked with symptoms of low fever on the second day afterward, and with numbness and inability to move the right arm. The side became tender and swollen; the fever typhoid, and the sensorium much affected. During the early part of Mr. SMART's illness he was taken care of by a servant who happened to wound the index finger of the right hand. The wound became inflamed, swollen, and livid; and although early opened, much pus was discharged, and the extensor tendon had suffered. A tumour soon afterward formed in the axilla, which was also opened. This man was removed to his father's house, and was nursed by his mother, who had an attack soon afterward of inflammation of the hand, with much fever. In none of the above cases "were the absorbents of the arm inflamed, showing the red line which usually marks the track of the mischief from the punctured part into the system." (TRAVERS, *Op. cit.*, p. 327.)

between this situation and the puncture or scratch in the finger or hand; unless the change exist in some of the nervous fibres, and be of such a nature as not to admit of recognition by the unaided senses. The constitutional commotion is generally ushered in by altered sensibility of the poisoned part and of the arm, but is unattended by any visible change, although in some cases the absorbents, either superficial or deep-seated, appear to be affected, and is characterized by its early appearance, and by remarkable physical and moral depression and anxiety, followed by rigours, which are succeeded by reaction and excessive nervous and vascular excitement, devoid of energy or vital power. The alterations which occur in the axilla and vicinity never commence until the constitutional disturbance is produced, generally after the rigours and consequent reaction, and are preceded by exquisite pain, often extending to the shoulder and arm.

511. *I.* The inflammatory changes in the axilla and vicinity do not take place in some of the most violent and dangerous cases; the poison, apparently, not being intercepted by the glands, and affecting chiefly the nerves and exerting its noxious influence upon the nervous systems and constitution generally.* These changes are merely contingent upon the majority of cases, and do not constitute the disease; the constitutional affection not only preceding them, but being also over-proportioned to them. They are, moreover, in some instances, entirely absent, as in the first phases above specified (§ 492). I therefore agree with Mr. TRAVERS in stating "that the local inflammatory action is an unessential and subordinate feature of the malady in its severest form; the disease itself consisting in a direct prostration of the vital forces, marked by preternatural excitement and rapid exhaustion."

512. *G. Treatment.*—It has been justly remarked by Dr. COLLES that, "whatever difference of opinion may be entertained as to the nature of this affection, it will be allowed that, although some few have escaped, yet the plans of treatment hitherto pursued have all proved quite unequal to contend with so formidable a disease." But the plan which he proceeds to advise has nothing to recommend it in preference to those which have been previously adopt-

* The following case illustrates this rapid and violent form of the malady: Mr. E., medical student, punctured his finger in opening a body recently dead. This occurred at noon (of Monday), and in the evening of the same day he found the wound painful. During the night the pain increased, and symptoms of high constitutional irritation were present on Tuesday morning. No trace of inflammation, however, was apparent beyond a slight redness of the spot at which the wound was inflicted, which was a mere puncture. In the evening he was visited by several physicians, but no local change could be discovered. The nervous system was agitated in a most violent and alarming degree, the symptoms nearly resembling the universal excitation of hydrophobia; and in this state he expired at three o'clock on Wednesday morning, forty hours from the injury. (TRAVERS on *Const. Irritation*, p. 262.) This case, and other instances of a less violent character, seem conclusive of one of two things, namely, either that the poison acts upon and affects the constitution through the medium of the organic nervous system, or that it is absorbed into the circulation in some cases without inflaming the absorbents or glands, or veins, occasioning the most severe effects upon the nervous system and vital energy, although inflammation of these structures, more especially of the glands and the surrounding cellular tissue, is often produced in consequence of the affection of the nervous system, or of the absorption, or of both.

ed, if, indeed, any definite or rational plan had ever been prescribed. The means which had usually been employed consisted of blood-letting, general and local, opiates, fomentations, purgatives, &c.: the blood-letting having been prescribed for the insufficient reasons that the pulse was rapid, and the febrile symptoms and delirium excessive: reasons more correctly indicating the propriety of adopting very different measures. Dr. COLLES, knowing that this treatment was most frequently followed by an aggravation of the malady, simply advises calomel in doses of three grains every three or four hours, with the intention of quickly exciting pyalism. But, despite of the magic number three, he might consider himself most fortunate if he succeed at all in this intention, and "fortunate beyond compare" if he succeed either quickly or with a perfectly favorable issue.

513. The virulent poison imbibed from a recently dead body invades the healthy frame with a rapidity and intensity proportionate to the deficiency of vital power opposing the invasion; and whatever means are administered to the person infected by this poison, calculated to lower vital power and resistance, will only aggravate the effects by accelerating the absorption, and facilitating the operation of it upon the frame. All animal poisons exert more or less of an asthenic influence upon the healthy body—an influence which is not only morbid, not merely an alteration from the healthy condition, but also one of depression, a condition characterized by an imperfect as well as altered manifestation of the functions of life, and tending to the extinction of those functions. But when this primary effect is not so intense, relatively to the powers of life, as to overwhelm these powers altogether, they react against it, oppose it, resist its extension, and often completely overcome it. In many instances the impression made by the poison on the nervous system, and the contamination induced in the circulating fluids, lead to a violent struggle between these changes and the powers which resist them; the struggle ultimately terminating either in the removal of these changes or in the annihilation of the powers which have opposed them. Now, if I have observed and interpreted aright the phenomena produced by the poison in question, this is what actually occurs after the imbibition of it by the healthy frame: *first*, asthenic and morbid action; *secondly*, vascular excitement, the morbid influence on the nervous and vital powers still continuing; and, *thirdly*, disorganization and death, which are rapid in proportion to the invasion of the cause, and the failure of the vital powers of resistance. If it were asked, What are the measures which are most likely to increase not only the first and third of these effects, but also the second! I could not hesitate to answer, those very measures which have been hitherto too generally adopted to remove them. It may, however, be contended that the reaction which supervenes requires to be moderated by blood-letting in order to prevent its exhaustion; but I have shown that the reaction is most morbid—is a tumultuous excitement, deficient of power or constitutional resistance; that the pulse is that of irritation—of what JOHN HUNTER would call constitutional alarm; that the blood is not inflammatory, and the coagulum is not firm; and,

moreover, that the rapidity of the pulse, and the severity of the delirium, and all the other symptoms are aggravated by this measure; and are of such character, and are attended by such phenomena, as ought to suggest a very different method of cure.

515. When treating of *diffusive inflammation* of the CELLULAR TISSUE, I pointed out the means which should be employed, both as *prophylactic* and *curative*, in the treatment of this disease when connected with, or consequent upon, poisoned wounds. Since that article was written, my farther experience has proved the correctness of my views, in respect both of the prevention and cure of the effects arising from the poison imbibed in the dissection of recently dead bodies, as stated in that article (§ 34, *et seq.*); and, therefore, I now more strenuously advise the adoption of the principles and means of treatment there recommended.

516. *a.* The *prophylactic* means should be promptly applied, and should consist chiefly of a *ligature* applied above the puncture, scratch, or abrasion, when the situation of either admits of its application, or a cupping-glass, or even a common wine or ale glass, may be applied in other circumstances, the air being excluded in the usual way, or suction or pressure may be employed: afterward the wound should be carefully washed, and a pledget of lint, wet with spirits of turpentine, placed over it. This application I have found more efficacious than any other, and it is not productive of any local irritation. When these measures have not been taken, or not taken sufficiently soon, the part wounded should be viewed as still containing a portion of the poison, and be subjected to them, although several, or even many, hours may have elapsed; and the constitutional powers ought to be fortified by means of pure air and generous living.

517. If *constitutional disturbance* should appear notwithstanding, or if it have already appeared owing to a neglect of prophylactic treatment, it should be promptly met by stimulating diaphoretics conjoined with tonics; and by warm or stomachic aperients, conformably with the principles maintained when discussing the treatment of diffusive inflammation of the *cellular tissue* (§ 34, *et seq.*) and of the *lymphatics* (§ 17, *et seq.*). The decoction of cinchona, therefore, should be given with liquor ammoniæ acetatis and full doses of the sesqui-carbonate of ammonia; and the bowels evacuated by means of a draught with equal parts of the spirits of turpentine and castor oil, and of an enema, containing the same substances, with or without ten grains of camphor. These may be subsequently repeated, according to circumstances.

518. *b.* The chief *intentions of cure* are, *first*, to prevent infection; *secondly*, to resist the extension of the mischief if infection have actually taken place; and, *thirdly*, to relieve the urgent symptoms, both constitutional and local, which usually appear when the disease is fully and unfavourably developed. The *first* of these having been premised, the *second* should be energetically employed, notwithstanding the tumultuous state of the vascular excitement or the delirium which may be present. The medicines just recommended ought to be early prescribed, and the dose of the ammonia suited to its effects. Instead of the combination of the

cinchona now mentioned, the decoction may be given with the chlorate of potass and the hydrochloric ether; and either of these combinations may be aided by the addition of camphor, by warm aromatics, by spices, &c., more especially by capsicum, which often prevents or alleviates the sickness and irritability of the stomach, and even the singultus of a more advanced stage of the distemper. If these do not relieve the disorder of the stomach, creasote should be given with camphor, capsicum, and small doses of opium, these medicines being generally indicated, when restlessness, watchfulness, or delirium supervenes. When, however, this last symptom appears, the doses of these substances ought then to be increased, and the morphia substituted for the pure opium or its tincture; full doses of these being given shortly before bedtime. Morphia or opium, or such of the preparations of opium as may be prescribed for the nervous symptoms of this malady, should be given in a very full dose, and conjoined with camphor or with capsicum or other warm spices, a full dose being given in the evening, and a smaller one in the morning. The infusion or decoction of cinchona may be also conjoined with other medicines, as the bicarbonate of potash, or soda, or ammonia, and be taken in a state of effervescence with citric acid or lemon juice; but the carbonate should be in excess, and the warm spices or aromatic tinctures be added. In the advanced stages of this malady, and for the local lesions which supervene in the course of it, the treatment should in all respects be such as already advised in the article on diffusive inflammation of the CELLULAR TISSUE (§ 34, *et seq.*).

519. *x.* PUTRID ANIMAL MATTER is productive of injurious effects when taken into the stomach; but these effects are much more serious when such matter is applied to an abraded surface, or to a wound, and more especially if it be injected into a vein.—*A.* As to the *ingestion* of this matter, Dr. CHRISTISON well observes, that “to those who are not accustomed to the use of tainted meat, the mere commencement of decay is sufficient to render meat insupportable and noxious. Game only decayed enough to please the palate of the epicure has caused severe cholera in persons not accustomed to eat it in that state. The power of habit in reconciling the stomach to the digestion of decayed meat is inconceivable. Some epicures in civilized countries prefer a slight taint even in their beef and mutton; and there are tribes of savages who eat with impunity rancid oil, putrid blubber, and stinking offal. How far putrefaction may be allowed to advance without overpowering the preservative tendency of habit, it is not easy to tell.” Something, however, is due to the nature of the beverages taken along with the articles in this state, and to the powers of digestion and assimilation possessed by those who partake of such food, in enabling them to resist the injurious effects produced by it in others.

520. *B.* The *exhalations produced by putrid or decaying animal matter* have generally been viewed as most noxious, until Dr. BANCROFT, the apostle of modern non-infection, endeavoured to prove, in a most ponderous volume, their very harmless nature. The present state of information, and the good sense, not only of

medical men, but of all competent observers, have completely disproved this absurd and injurious opinion. These exhalations are generally more or less noxious, especially when inhaled into the lungs for some time, or in certain states of predisposition to be infected by them, or in grades of considerable concentration, or when dissolved in the humidity of the atmosphere. M. MAGENDIE demonstrated that dogs confined over vessels in which animal matter was decaying experienced similar effects to those observed in the experiments performed by him and M. GASPARD upon the introduction of putrid animal matter into the veins. These effects resembled in every respect the *putrid form of fever* described in the article FEVER (§472, *et seq.*). The fact that putrid effluvia generate fever in man has been sufficiently demonstrated to require any illustration at this place, and has been sufficiently proved by evidence referred to in various parts of this work, and by proofs which have come under my own observation. The instances which have been adduced in opposition to it by Dr. BANCROFT, PARENT-DUCHATELET, and others, prove only that these exhalations are not poisonous in every case or occasion of exposure to them, and that habit and other circumstances may impart to some persons an immunity from their usual effects. These exhalations have often produced not only *putrid* or *adynamic fevers*, but also an *adynamic form of dysentery*; and in some cases which I was lately called upon to treat, I had every reason to infer that these exhalations may produce dysentery by their action upon the mucous surface of the anus, when resorting to such privies as contain large accumulations of fecal matters, especially during warm seasons. An asthenic form of irritation and inflammation, with adynamic fever, was observed in these cases, the local affection extending from the margin of the anus upward along the mucous surface of the rectum and colon; and, in three instances, affecting also the vagina and uterus in a similar manner, and with similar discharges.

521. C. When putrid animal matters or fluids are *inoculated* or inserted into *wounds*, or applied to *abraded surfaces*, extensive local inflammation of a diffusive or spreading kind, with very low or adynamic fever, is developed, owing to the rapid contamination produced locally as well as in the circulating fluids, and death takes place, unless the mischief be early arrested by a very active stimulating, antiseptic, and tonic treatment. The injuries received from dissection of putrid bodies, and by cooks when dressing very high game, are of this kind, they being generally attended by a diffusive cellular inflammation and adynamic fever, and are different, in both the local and the constitutional phenomena, from the injuries received in the dissection of recent bodies, although allied to them in many respects. (See CELLULAR TISSUE—*Diffusive Inflammation of.*) Putrid animal matters occasion somewhat different effects, according to the nature of the matter, the degree of putridity, and the constitution of the individual, but these effects are more or less allied to those produced by poisons which I have viewed as septic, and classed accordingly. (See CLASS SEPTIC POISONS.)

522. D. The Treatment of the effects produ-

ced by putrid animal matters received into the stomach is in every respect the same as that recommended for the poison of pork or of sausages, &c. (§443, 450). After the offending matters have been evacuated, either by encouraging vomiting or producing it by the means just advised, *creasote* may be given with the warm spices already mentioned, and these may be mixed with powdered charcoal or in solutions of the chlorides, and taken in doses which the urgency of the case will suggest. If dysenteric symptoms supervene, these medicines may be conjoined with ipecacuanha and opium, or may be administered in enemata; and the rest of the treatment recommended in DYSENTERY, according to the form which the case may assume, may be adopted. I have lately given, in some dysenteric cases which have been produced by putrid animal exhalations, small and repeated doses of creasote, and a weak solution of the chloride of zinc, with marked benefit. The chloride of lime may also be given in small, but often-repeated doses, and lime-water, with milk, or in effervescence, or Carara-water, may be used as beverages. The effects caused by the *inhalation* of putrid effluvia require similar means to those prescribed for the adynamic or putrid forms of fever. (See ARTS. DYSENTERY and FEVER.) The treatment of local contaminations by putrid matter is not different from that about to be recommended for *septic poisons*.

523. XI. TOBACCO.—*Indian Tobacco*—*Lobelia Inflata*.—*Virginian Tobacco*—*Nicotiana Tabacum*.—The poisonous operation of these two plants closely resembles that of each other, the latter being the most energetic.—A. In doses exceeding fifteen or twenty grains, the *Lobelia* causes speedy and severe vomiting, with distressing nausea and sense of sinking at the epigastrium; sometimes purging, cold perspirations, giddiness, headache, tremours, and great relaxation and prostration of strength; failure, with intermissions of the pulse, sometimes a prickly sensation through the body to the extremities, and a smarting in passing the urine. In doses above thirty or forty grains of the powder, it produces death in a few hours, if it be not thrown off the stomach by the speedy vomiting induced by it. The most prominent symptoms are then, according to Dr. WOOD (*Lancet*, April, 1837, p. 144), extreme prostration, great anxiety and distress, and ultimately death, preceded by convulsions. Fatal effects have often resulted from the empirical use of this plant in America, owing chiefly to its not having been rejected by vomiting, as is sometimes the case. The effects produced by it are the same as those now described when it is administered in an enema.*

* [The *Lobelia*, or Indian tobacco, is a violent acrid irritant, and has occasioned many deaths from its improper use by empirics. The following cases are examples of the fatal effects of this article when improperly administered:]

The sixth volume of the Massachusetts Reports contains an account of the trial of SAMUEL THOMPSON for the murder of EZRA LOVETT, by administering *lobelia*. It appears that the patient, being confined by a cold, sent for Mr. T., who gave him three powders of *lobelia* in the course of half an hour, each of which vomited him violently, and left him in a great perspiration during the night. The next day two or more powders were given, each of which operated by vomiting, and occasioned great distress. In like manner, two other powders were given the subsequent day, leaving the patient in a state of great prostration. Several days after this, finding the patient still worse, Mr. T. gave sev-

524. *B. Virginian tobacco*, in the present state of society, is one of the most important plants in nature, and one of the most deleterious poisons furnished by the vegetable creation. In whatever way tobacco is used, whether chewed, smoked, or snuffed, habit impairs, and even modifies its effects. Sir B. BRODIE found that the infusion of tobacco thrown into the rectum, paralyzes the heart and causes death in a few minutes; but if the head of the animal be previously removed, and artificial respiration kept up, the heart remains longer unaffected, proving that tobacco disorders this organ through the medium of the nervous system. On herbivorous animals the effects of tobacco are less marked than on man.

525. *a.* In small doses, tobacco causes heat in the throat and warmth in the stomach, followed, especially if the dose be somewhat greater, by nausea, giddiness, and vomiting. In larger doses, it occasions nausea, vomiting, purging, a distressing feeling of sinking at the epigastrium, but rarely any pain. It seldom promotes sleep or evinces any narcotic influence beyond what depends upon its sedative action. In poisonous doses, its most remarkable effects are languor, feebleness, great and depressing anxiety, fainting, relaxations of the muscles, trembling of the limbs; vision and all the senses are enfeebled, the ideas confused. The pulse becomes small, weak, irregular, or intermittent; the respiration laborious; the surface and extremities cold and clammy. Recovery generally takes place if the symptoms proceed no farther; but if the vomiting continue, or if the purging be frequent, the tendency to faint

becomes urgent, the features sunk, the muscular powers paralyzed, the pulse progressively weaker, the extremities and surface colder, and covered by cold sweats; and, ultimately, convulsive movements, general paralysis, torpor, and death take place.

526. *b.* Tobacco is used in various ways, the effects produced by it being remarkably influenced by habit in whatever way it may be employed, at least up to a certain amount or dose. In the form of *snuff* it acts locally chiefly. The habitual use of snuff blunts the sense of smell, and, if it be taken in excess, dyspepsia, with peculiar symptoms, and a cachectic appearance of the surface, are produced by it. Dr. PROUT considers the dyspeptic symptoms caused by snuff to be peculiar and severe, and that malignant diseases of the stomach and liver are sometimes occasioned by this practice, when excessive or long continued.

527. *c.* *Smoking tobacco* in any way produces many of the symptoms described above, if it be long continued by a person unaccustomed to it. Dr. M. HALL detailed a case which nearly terminated fatally; the subject of it having, for his first essay, smoked two pipes. Dr. CHRISTISON refers to two cases recorded by GMELIN, which were fatal; seventeen pipes in the one, and eighteen in the other having been smoked at a sitting. This practice has been adopted by some with the idea that it is a prophylactic against endemic, epidemic, and contagious diseases; but there are really no grounds for this opinion. Smoking, especially when very frequently indulged in, weakens the digestive and assimilating functions, lowers the tone of the nervous system, imparts a pale, sallow, and cachectic hue to the countenance and skin, and induces functional disorder of the stomach, liver, and bowels. The soothing and flattering visions with which the practice of smoking feasts the weak and effeminate mind, lead to its adoption by most classes; but it is an enervating and an emasculating luxury; the offspring of those who indulge in it in excess being weak, puny, or stunted in growth; or of a nervous, susceptible, and serofulous conformation. It often, also, induces a desire for spirituous liquors.

528. *d.* *Chewing tobacco* is even a more deleterious habit than that of snuffing or smoking. It is practiced chiefly by sailors and the natives of the United States of America. In sailors, the sea air probably counteracts its injurious influence; but when commenced in boyhood, as is often observed in this class, it stunts the growth, and in all circumstances it weakens the organic nervous energy and the mental powers, impairing also the powers of application. Persons habituated to this mode of using tobacco are irritable, restless, and miserable when deprived of it, and feel a distressing sinking at the epigastrium. If they continue long to indulge in it, they lose their healthy appearance, and, although they may not evince any severe or specific disease, the nervous system—the mental powers especially, are weakened by the habit, and they become prematurely aged and short-lived. [These remarks can only apply to tobacco when employed in excess; for, as above remarked, “habit impairs, and even modifies its effects.”]

529. *e.* The application of tobacco to a recent

eral more powders, which produced great distress, and at length ceased to operate. Still more lobelia was administered, until the patient lost his reason, and became convulsed so as to require two men to hold him. To relieve these symptoms, two more powders were forced down, and the patient soon expired.

The accused was tried for murder, but for want of sufficient evidence of malice prepenae, he was acquitted.

A very similar trial took place before the Court of Sessions in the city of New York, in December, 1837, in which a Thompsonian doctor by the name of FROST was tried for killing a Mr. FRENCH, by the administration of lobelia. In this case, lobelia was freely and repeatedly administered, both by mouth and injection; besides which, the patient was repeatedly steamed, and took large quantities of “composition tea.” This course was continued until inflammation of the stomach, bowels, and brain was induced; delirium, with great prostration, took place, and the patient sank, exhausted.

On this trial, several botanic physicians testified that lobelia was not dangerous in any doses. The accused was found guilty, and sentenced to incur the penalty of fine and imprisonment.

Another trial of a similar kind took place at Binghamton, N. Y., in May, 1844, which is reported in the New York Journal of Medicine and Surgery for November, 1844, by Dr. DAVIS.

The patient had been complaining for some days. The accused, Dr. DEARE, commenced by giving some medicine to prepare the stomach for an emetic. The next morning he gave at least a tea-spoonful of the seeds of lobelia. About noon, the patient became much distressed for breath; ginger tea was ordered, of which three tea-cups were given; a decoction of lobelia, containing a quantity of the seeds, was next administered in divided doses; convulsions set in, and the patient expired. On a post-mortem examination, a table-spoonful of lobelia seeds was found in the stomach; the mucous membrane of the stomach was softened and much inflamed; the intestines also were much inflamed. The botanic physicians testified that lobelia would not excite inflammation under any circumstances, and that it does not possess poisonous properties. The accused was found guilty. Other cases could be given to the same effect, all going to prove the dangerous effects of this article when given in considerable doses. (See *Bigelow's Med. Bot.*, vol. i., p. 161; *Phil. Journ. of Pharmacy*, vol. v., p. 300; vol. ix, p. 98.)

round, to an abraded surface, or to sores, is often attended by serious or even fatal effects. Mr. WESTON has recorded a case in which the expressed juice of tobacco was applied to the head of a boy, aged eight years, for the cure of tinea capitis. Death took place three hours and a half after the application. Three children were seized with giddiness, vomiting, and fainting from the application of tobacco leaves to the scalp for the cure of an eruption.—(*Ephemer. Cur. Nat.*, Dec. ii., Ann. iv., p. 467.)

530. *f.* Tobacco has not infrequently been employed fatally in an *enema*. I have witnessed this result from half a drachm of the infusion having been thus prescribed. An instance is adduced in the British and Foreign Medical Review (vol. xii., p. 562), in which the decoction of twelve grains in six ounces of water, used as an enema, was fatal. Cases of a similar result from larger quantities of this plant, administered in this way, have been recorded by DESAULT, GRAHL, COOPER, BELL, and others; and it has not infrequently caused death when thus employed by empirics. The symptoms produced by it, thus administered, are similar to those already described; nausea, relaxation of the muscles, failure of the pulse, tremours, faintness, cold sweats, and excessive sinking, or fatal syncope, being the most characteristic phenomena.

531. *g.* The appearances on dissection, as described by Dr. GRAHL, are thus stated by Dr. CHRISTISON. Great lividity of the back, paleness of the lips, flexibility of the joints (two days after death), diffuse redness of the omentum, without gorging of the vessels, similar redness with gorging of vessels on both the outer and the inner coats of the intestines; in some parts of the mucous coat patches of extravasation; and unusual emptiness of the vessels of the abdomen. The stomach was natural, the lungs pale, the heart empty in all its cavities, and the brain was natural.

532. *h.* The operation of Virginian and Indian tobacco is nearly the same. The action of Virginian, or common tobacco, is similar to that of foxglove; but it is slightly irritant of the digestive mucous surface, and much more paralyzing, causing more decided relaxation and depression of muscular power, with trembling. It, moreover, acts more decidedly upon the secretions and upon exhaling surfaces. The action of this poison differs from that of *Belladonna*, and from that of *Stramonium* or *Hyoscyamus*, in the contraction of the pupil when applied locally or taken in poisonous doses, and in the absence of any affection of the throat, and of delirium or other cerebral symptoms. The influence of tobacco differs also from that of *aconite*, in its more decided effect upon the muscular system, while *aconite* paralyzes the sentient nerves, occasioning numbness and tingling, which are not observed after the administration of tobacco.

533. *i.* Treatment.—Poisoning by swallowing this plant, or preparations of it, is very rare, a few cases only being recorded. The discharge of the poison from the stomach, by the means usually resorted to, should be as speedy as possible. There is no chemical antidote to it yet known; but Dr. PEREIRA thinks that the vegetable acids and astringents, the infusion of nut-galls, of green tea, &c., may be employed

with benefit. In order to allay the vomiting and depression of vascular action, ammonia, brandy, capsicum, and other spices, with small doses of opium; the cold affusion on the head, if congestive or apoplectic symptoms occur; the use of strong coffee; sinapisms over the epigastrium, and the other means advised for the other poisons of this class, are chiefly deserving adoption.

534. xii. VEGETABLE ACRO-SEDATIVES OF DIFFERENT SPECIES, besides those already noticed, have produced serious effects; but their operation, and the symptoms they occasion, have not been satisfactorily observed. The chief of these are the following: A. CASTOR SEEDS.—The seeds from which castor oil is extracted contain in the embryo a most active acro-sedative poison, a few of them being sufficient to produce violent purging and death. Mr. TAYLOR adduces the following illustration of their effects: A lady, aged 18, ate about twenty of these seeds, one of her sisters ate four or five, and another two. In the night of the evening on which this took place, they were all taken ill. The deceased, who had taken the largest number, felt faint and sick about five hours afterward, and vomiting and purging came on, and continued through the night. The following morning she presented all the symptoms of malignant cholera. The skin was cold and dark-coloured; the features contracted, and the breath cold; the pulse was small and wiry; there were restlessness, thirst, pain in the abdomen; and she lay in a drowsy, half-conscious state. Whatever liquid was taken was immediately rejected, and the matters passed by stool consisted chiefly of a serous fluid tinged with blood. She died in five days without having rallied. On inspection, a very large portion of the mucous membrane of the stomach was found abraded and softened in the greater curvature. There was general vascularity of the organ, and the abraded portion presented the appearance of a granulating surface of a pale rose-colour, and was covered by a slimy mucus. The small intestines were inflamed, and their inner surface abraded. The two sisters recovered. Two or three of the seeds act as a violent depressing cathartic. The irritant poison resides in the embryo, and is not expressed with the oil, which, in its fresh, or non-rancid state, is a mild purgative.

535. *B. LATROPHA MANIHOT—Iapiha Manihot.*—The fresh root, or the juice of this plant has been long known as a violent poison. It produces nausea, vomiting, and purging; pain, tenesmus, swelling of the body, loss of sight, coldness of the extremities, faintings, and death. Dr. BECK refers to cases in which the juice had produced these effects within an hour. The dissection of one case furnished no alteration, excepting that the stomach was found shrunk to half its natural size. The noxious property of this plant is destroyed by heat.

536. CLASS VI. IRRITANT AND ALTERANT POISONS.—ACRO-ALTERANT POISONS.—This class of poisons is very closely allied to the *fifth*. It comprises those substances and preparations which, either in acutely or chronically poisonous doses, not only irritate the digestive surfaces, but also alter the vital properties and manifestations of the tissues—not so much dy-

namically, as in the preceding classes, as in character or kind. When administered in large doses, the alterative effects may not become very apparent if they produce death in a short period, if they are so given as to prove *acutely* poisonous; but during their *slower* or more *chronic* operation, and during recovery from their *acute* action, the alterative effects are more fully evinced. Several of the substances comprised under this class are much employed medicinally, and have been, and even still are, prescribed, although much more rarely, so as to produce most injurious effects, owing to the alterant influence exerted by them upon the functions of several surfaces and organs, and not upon the functions merely, but even upon the organization of the structures ultimately and remotely. There are several substances which have been already considered, that produce also an *acro-alterative* effect, when administered in smaller quantities or in repeated doses. But as these, when employed as poisons or in large quantities, act either as *corrosive* poisons or as *acro-sedative* poisons—in the one case corroding or disorganizing the tissues to which they are applied, and in the other depressing, or altogether annihilating nervous influence or vital power—I have thought it preferable to treat of them under these classes. Even the same poison, however virulent, does not act in a certain definite manner and specific mode, but in different ways, according to the amount, repetition, or continued exhibition of it; and to the various modifying influences already described (§ 51, *et seq.*). Poisons are not to be viewed as specific entities, producing certain and determinate results, but as powerful agents affecting nervous influence, vascular action, vital power and resistance, and even the organization of the frame, in varying modes and grades; the more manifest effects furnishing, by their prominent features especially, such characters as enable us to arrange and classify them. And thus we find that many poisons, as corrosive sublimate, the concentrated acids and alkalis, several mineral and other saline substances, and even the vegetable acids, act as corrosive and acute poisons, and destroy life, chiefly by the intensity of their local action, when taken in sufficient quantity in certain states of the stomach, while the same substances, when administered in smaller or repeated doses, or in states of greater dilution, or when their exhibition has been too long continued, are fatal, or are injurious, owing to different modes of action, and to their remote and secondary effects produced by different channels, their effects having a very intimate reference not only to their quantities and modes of exhibition, but also to the constitution and states of the sufferer at the time. Hence many corrosive poisons, when thus or otherwise exhibited, act as sedatives, or as irritants, or as acro-sedatives, and produce effects similar to those classed under these several heads, or act as acro-alteratives, and operate in nearly similar modes to those substances now about to be noticed.

537. i. **BELLADONNA**—*Deadly Nightshade*.—*Atropa Belladonna*—*Atropia*—has usually been classed as a narcotic, or acro-narcotic poison; but although the last stage of poisoning by it is often attended by sopor or insensibility, it is

not strictly a narcotic, as will appear from the symptoms produced by it. The leaves, roots, and berries of the plant are poisonous, and produce nearly the same effects in equally powerful doses. On dogs, this plant causes dilatation of the pupil, plaintive cries, efforts to vomit, staggering, weakness of the posterior extremities, frequent pulse, a state resembling intoxication, and death (PEREIRA). I have seen dangerous, and in one instance nearly fatal effects result from the medicinal use of preparations of this plant.

538. A. The symptoms vary remarkably with the dose and the frequency of its repetition, with the mode of administering it, and the constitution of the sufferer. The most rapid appearance, and the most comatose state of the symptoms have followed the administration of an infusion or extract of this plant in an enema. Dr. SCHARF states, that four ounces of an infusion of the root injected as a clyster produced coma and death in five hours. In a case to which I was called, the extract had been introduced into the rectum as a suppository, but the exact quantity I could not learn. Apoplectic coma soon followed, from which the patient recovered with difficulty, delirium both preceding and following the coma. The poisonous operation of belladonna is most rapidly and fatally developed, when any of the preparations of it is administered as an epema.

539. a. The local or irritant action of this plant is not very intense, and is exerted primarily upon the upper portion of the digestive canal, especially the fauces and œsophagus, causing dryness and redness of the throat with slight difficulty of swallowing, and but seldom vomitings or purging. In some instances soreness of the throat, difficult deglutition, and even aphthous inflammation of the fauces have been more remarkable; and in rarer cases, bloody stools, strangury, and even bloody urine have appeared consecutively, or have accompanied the nervous symptoms. The irritation of, and eruption on, the skin, characteristic of this poison, appears chiefly after a frequent or prolonged use of small doses of it. This eruption has been observed by me in several instances where I had employed belladonna. It has been likened to that of scarlatina; but it has as frequently resembled the eruption of measles. It has sometimes followed the use of the extract in ointments which I have prescribed for irritable states of the rectum or uterus.

540. b. The alterative operation of the preparations of belladonna is varied and uncertain, and is exerted chiefly on the nervous systems, more particularly upon those portions which are most intimately connected with the manifestations of sensibility and intellect. Thus we observe dilatation of the pupils, insensibility of the irides to light, dimness of vision, diminished feeling, vertigo, staggering, delirium, and occasional sopor, successively follow the excessive use of them. The alterative operation of this poison on others of the systems or organs of the body is problematical, although the uterine functions have been said to have been influenced by it. This plant, especially the tincture and inspissated juice or extract of it, is a valuable remedy, not merely as an anodyne, but also as an alterative in several diseases; but, if exhibited without due caution, especially in

children, or in whooping-cough, it is liable to be followed by injurious or even dangerous effects. Accidents from this poison most frequently are observed in children, who sometimes eat the berries.

541. The husks and seeds of the berries are very indigestible, and may remain long in the stomach or bowels, whether the case recover or prove fatal, especially if free vomiting has not been early procured. In one case the seeds were vomited towards the close of the third day. (*Med. Obs. and Inq.*, vol. vi., p. 224.) In another case the black husks appeared in the stools after the use of laxatives on the second day. In several other cases adduced by M. BOUCHER, fragments of the fruit were vomited on the second day, and passed by stool on the third, although actively treated from the commencement. But this can occur only when the fruit has been taken accidentally or by mistake; but all cases of poisoning by belladonna are not of this kind. Even the administration of preparations of this plant for medicinal purposes may be such as to occasion either dangerous or fatal effects, especially in children; and the juices of it may be given with felonious intentions. They have been so employed, either mixed in wine or in other fluids, in the commission of murder; and even to aid the commission of thefts or robberies; decoctions and infusions of various parts of the plant having likewise been used for the same purposes, as recorded in numerous works of the preceding two centuries. Dr. CHRISTISON remarks, that other species of *atropa* are probably similar in their properties to belladonna. WILMER quotes instances of frantic delirium having occurred among shepherds, as well as their cattle, from eating the *Atropa mandragora*, which was used by the ancients in medicine.

542. *B. Atropa*, the active principle of this plant, is not likely to be employed as a poison. Given to the lower animals, it produced the same symptoms as the berries or the leaves. One tenth of a grain caused in the human subject dryness of the mouth, constriction of the throat, difficulty of swallowing, dilatation of the pupil, headache, and stupor.

543. *C. Diagnosis*.—Whatever part or preparation of this plant may have been taken into the stomach, or otherwise administered, dilatation of the pupil is always observed if the dose is poisonous. This symptom precedes the *delirium*, the character of which is peculiar and *diagnostic*, especially when viewed in connexion with the state of the pupil, and the dryness, soreness, or constriction of the throat. The delirium is generally gay, extravagant, pleasing, talkative, more rarely furious. It is sometimes attended by uncontrollable laughter, and occasionally by loss of voice. Vision is obscure, the iris is insensible to light, and the eyeball sometimes red and prominent. A state resembling somnambulism has, in rare cases, been observed. The sopor or lethargy produced in the more severe cases generally does not appear for a considerable time after the poison has been taken. *Giddiness* first occurs, and is followed by the delirium, which may continue for several hours before *sopor* takes place; but in some instances the sopor has occurred more early, and has been followed by delirium. Occasionally, even in the same case, the delirium,

which preceded the stupor, returns when the stupor goes off; and very frequently the stupor is not distinct at any stage, showing that this poison should not be classed with narcotics. *Convulsions* are not frequently produced by it, unless in children; in adults they are slight, or confined to the muscles of the face; but *subul-tus tendinum*, or catching of the extremities, is frequent. The periods at which the symptoms appear vary much. Giddiness may appear in a few minutes, or not until two or three hours, and the affection of the eyes about the same time, or soon afterward. The delirium may be delayed for some hours. These symptoms may continue for two or three days. They generally persist much longer than in cases of narcotic poisoning. In some instances these symptoms, especially the blindness and state of the pupil, giddiness, tremours, and other nervous affections, continue several days, or even weeks.

544. *D. The appearances after death* have not been observed in many instances. In a case described by GMELIN, the subject of it died twelve hours after eating the berries. The body was examined twelve hours after death, and yet putrefaction had commenced, so that the abdomen was swollen, the scrotum and penis distended with fetid serum, the skin covered with dark vesicles, and the brain soft. The blood-vessels of the head were gorged, and the blood everywhere fluid, and flowing profusely from the mouth, nose, and eyes. M. ROQUES describes somewhat similar changes to the above, and states them to be usually found after poisoning by this plant, especially the swelling of the abdomen, livid spots on the surface, exudations of blood, or of a bloody froth from the mucous canals, especially the mouth and nostrils, and sudden and rapid putrefaction, preceded by general intumescence of the body. When the berries, husks, or seeds have not been vomited or passed by stool, they are sometimes found in the alimentary canal, and furnish evidence of the nature of the case; when they have been evacuated, and are detected in the discharges, they assist the diagnosis, which is seldom difficult when any part of this plant has been eaten accidentally, or otherwise administered. (See M. Roques, *Phytophagie Médicale*, t. i., p. 229, *et seq.*)

545. *E. Treatment*.—The speedy and complete evacuation of the poison from the stomach, by means of an emetic of zinc, to which capsicum may be added, in order to arouse the paralyzed organ, should be first attempted, especially when the fruit has been eaten. In these cases the stomach-pump ought not to be confided in alone, although it may be required in aid of the emetic, the free operation of which should be duly promoted. The older writers strongly advised recourse to vinegar, and either it or other vegetable acids will prove serviceable after the poison has been evacuated. The cold affusion on the head and neck is indicated for the removal of the delirium or sopor; but it should not be continued too long at a time. In some cases tepid affusion may be substituted for the cold. Dr. PEREIRA suggests the administration of nut-galls or green tea. I found full doses of camphor and chloric ether successful in a case in which the inspissated juice, administered by the rectum, proved nearly fatal, tepid affusions having been also administered.

546. ii. CANTHARIDES—*Cantharis Vesicatoria*—the *Blister Beetle* or *Spanish Fly*—*Cantharidin*—*Vesicatorin*.—Cantharides may be poisonous in any of the forms in which they are employed in medicine—in that of powder, or of tincture, of vinegar, of cerate, ointment, or plaster. Applied *topically*, they excite the nerves of the part, and irritate and inflame the capillaries, occasioning first a sense of heat, followed by pain, redness, and slight swelling. They are readily absorbed into the circulation, or their active principle, *Cantharidin*; and, in addition to their local action, they produce very energetic effects upon the vascular and nervous systems, especially on the spinal cord, and upon the urino-genital organs.—*A.* Their *local action* is irritant and inflammatory; their *remote operation* is alterative, exciting, irritating, and inflaming, according to the amount and repetitions of the dose; their *primary* influence being exerted on the nervous systems, their *secondary*, or consecutive operation, being produced chiefly through the medium of the blood. They are eliminated by the kidneys, on which, and on the urinary bladder and passages, they produce the effects just described. They are thus closely allied in action to several substances comprised under the class of acrid and corrosive poisons, on the one hand, and to many of those belonging to the excitant and irritating classes on the other. The local action of cantharides is nearly the same wherever they are applied, and their remote effects are also the same, whether they are taken into the stomach or applied to the skin denuded of its cuticle, or to a wound, or thrown into a vein. They have destroyed life when taken as an aphrodisiac, or to produce abortion, or accidentally. They are very rarely employed to produce murder or suicide.

547. *B. Symptoms.*—*a.* These vary with the mode of exhibiting this poison and the quantity of it administered. When it is taken in large or repeated doses, or to an amount sufficient to produce a *sub-acute form* of poisoning, heat and pain in the throat, stomach, and intestines are experienced. To these are soon added thirst and pain in the loins, extending along the ureters to the bladder, with a burning sensation in this viscus, a frequent desire to evacuate the urine, which is passed frequently, in small quantity, with difficulty, and sometimes more or less tinged with blood. The pulse is frequent and hard, the skin hot, and the respiration quickened. The nervous system is somewhat excited, painful priapism, with or without satyriasis, being also present. In still larger quantity the effects are more *acute*. A violent burning is felt in the throat, gullet, and stomach, with pain and tenderness in the epigastrium, extending over the abdomen, with sickness and vomitings. To these are added extreme thirst, and pain in the loins and bladder; dryness and heat of the mouth, sometimes with fetor or with pytalism; and incessant desire to void urine, the attempts to evacuate it being attended by excruciating pain, and nothing but drops of blood or of bloody urine being passed, and excessive tenderness of the whole abdomen. The heat and constriction of the throat increase, and are attended by distressing difficulty of deglutition. Violent griping pains of the bowels, with purging or with tenesmus, bloody stools, &c., are generally experienced. The difficulty of deglu-

tition is often accompanied with a dread of fluids, although the thirst is urgent, and the matters vomited consist chiefly of mucus, or flakes of lymph streaked with blood. The priapism is painful and constant, the genital organs being swollen and inflamed. In some instances maniacal delirium, tetanic convulsions, and coma supervene, and terminate life; in others the delirium is less marked, giddiness, faintings, sinking of the pulse and vital powers, and other symptoms of gangrene consequent upon acute inflammation, being present. *Death* is more immediately produced either by the inflammation and consequent gangrene of the alimentary canal, or of the genital and urinary organs, or partially of both, or, if the patient live somewhat longer, by the intensity of the nervous symptoms.

548. *b.* The *duration* of the symptoms depends upon the susceptibility of the individual to the action of cantharides, upon the preparation of it administered, and upon the treatment. The tincture is followed by a more immediate effect than the powder. Even in fatal cases death seldom takes place before three or four days, and it may not occur until after two or three weeks, from the consequence of the inflammation produced in the alimentary canal, or in the urinary passages, or even in the brain, or spinal cord, or their membranes. Sometimes the nervous symptoms do not appear until several days after the ingestion of the poison. The *quantity* which may be considered sufficient to destroy life depends upon the nature and strength of the preparation. ORFILA has seen twenty-four grains of the powder prove fatal; but as abortion was first produced, it is probable that this circumstance not only accelerated, but also aided this result, which occurred on the fourth day. The smallest quantity of the tincture which has caused death is one ounce, the individual having lived fourteen days. But, while smaller quantities may occasion dangerous or even fatal results, much larger may fail of producing very serious effects, the circumstances so frequently referred to remarkably affecting the issue. Instances have occurred of *blistering plaster* having been swallowed by mistake. In one case, half an ounce of the plaster, containing two drachms of the powder, was taken, and death occurred in twenty-four hours (*Edin. Med. and Surg. Journ.*, Oct., 1844), the shortest period in which cantharides have been fatal.

549. *c.* The application of cantharides to the skin as a *vesicant*, or external irritant, being very generally adopted, is in many cases productive of fatal consequences, owing to the severity of the local alterations, to the intensity of the inflammation and sphacelation they sometimes occasion, and to the spreading of these effects, and, more rarely, to their influence upon the urinary organs and nervous system. The mischief thus produced occurs chiefly in infants or young children of a cachectic habit of body, or in those with either a deficiency or an exuberance of blood, or when the application is too long continued, or is followed by injudicious topical dressings. It is most likely to occur when the blister is applied on children infected with the more adynamic or malignant forms of the exanthemata, especially measles and scarlet fever and is allowed to remain too long upon

the part, or after redness is produced. The admission of the air to the denuded surface, and the application of rancid ointments as dressings, are also often concerned in producing these serious local effects.

550. *C. Appearances on Dissection.*—In the acute cases, and when death has taken place after a few days, the mouth, œsophagus, stomach, and small and large intestines, as well as the kidneys, ureters, bladder, and genital organs, have been found inflamed, and even, in rare instances, sphacelated in parts. In an instance where an ounce of the tincture had been taken, and death did not occur until the fourteenth day, the villous coat of the stomach was not inflamed, but it was pulpy and easily detached; but the kidneys were inflamed. In the most rapidly fatal cases the powder may be detected adhering to the villous coat of the stomach. In more prolonged cases, congestion or increased vascularity of the brain, cerebellum, spinal cord, and their membranes have been observed. Ulceration of the bladder in some instances, and even sphacelation of the genitals, have been mentioned.

551. *D. Treatment.*—Cantharides are productive of severe irritation passing into acute or sub-acute inflammation, according to the quantity administered; and their absorption is followed by inflammation of the urinary organs, and by excitement, and sometimes by inflammatory irritation of the nervous centres. The indications of treatment are hence obviously, 1st. To remove the poison by emetics, and by encouraging vomiting; and, 2d. To allay the inflammatory action in these parts. When the sufferer is seen sufficiently early, and vomiting has not commenced, ipecacuanha should be given in copious emollient and demulcent draughts, and its operation promoted by tickling the fauces, by the tepid infusion of chamomile, &c. The inflammatory symptoms require general and local blood-letting; but if there be reason to infer that any of the poison still remains on the stomach, the discharge of it should be procured or attempted previously to resorting to depletions, lest absorption be promoted. When blood-letting is prescribed, it should be employed in a decided manner, and aided by demulcents containing small or moderate doses of camphor and nitre, with opium, henbane, &c. Emollient injections into the large bowels and into the bladder, and warm baths, hip-baths, fomentations, &c., are always beneficial. Oil was once supposed to be an antidote to cantharides; but there is no known antidote to this poison; and oil is now ascertained rather to aggravate than to alleviate the symptoms, by dissolving the active principle of cantharides.

552. Poisoning by the external application of cantharides requires the same treatment as now advised. In these cases, the urinary organs are generally more affected than the digestive canal, and diluents, demulcents, opium with camphor, are chiefly required, unless in the more severe cases, when blood-letting is necessary. But these cases generally soon recover, unless the poison be applied to a very large surface or to a recent wound; and in these the protection of the surface from the air and full doses of opium are requisite. During recovery the digestive and urinary organs long remain irritable, and the nervous system sus-

ceptible; therefore a bland farinaceous or vegetable diet should be adopted, and continued for some considerable time, and flannel worn nearest the skin.

553. iii. CHLORINE AND THE CHLORIDES.—*A. Chlorine gas* produces violent spasm of the glottis if it be inspired in a pure state.—*a.* Mixed with air it causes a sense of tightness of the chest, of suffocation and violent cough, owing to the irritation of the bronchi and spasm produced by it—a state of artificial asthma. [Chlorine is apt to produce severe pain in the back part of the head, and a powerfully depressing effect upon the circulatory system, as we have repeatedly witnessed.] This effect, if not excessive, generally passes off with increased mucous expectoration. When much more diluted with air, it occasions a sensation of warmth in the chest, and promotes expectoration. As a principal fumigating and disinfecting agent, it is liable to produce injurious effects, when air too strongly impregnated with it is breathed; but it is chiefly in manufactories that it is most likely to be hurtful, although the irritating effects of chlorine are less powerful on those accustomed to inhale it. Dr. CHRISTISON was told by a chemical manufacturer in Belfast, that his workmen can work with impunity in an atmosphere of chlorine, where he himself cannot remain above a few minutes. The chief effects produced by inhaling this gas by the workmen are more or less emaciation from the absorption of fat, acidity and disorder of stomach, which are usually corrected by chalk.

554. *b.* When diluted with air, or aqueous vapour of 116° F., and applied to the external surface, it produces peculiar sensations similar to the stinging of insects, accompanied with copious perspiration and determination of blood to the skin, and sometimes followed by an eruption of minute papulæ. In a pure form, its action on the skin is similar, but more energetic. A repeated or prolonged application of the gas to the skin is followed by soreness of the gums and mouth, or fauces, occasionally by slight ulceration, and generally by a more abundant as well as altered state of the salivary and biliary secretions. Mr. WALLACE believed that it tranquillizes while it excites nervous power; and Professor ALBERS, that it is stimulating locally, and antiphlogistic remotely. Many years ago, I examined its operation with Mr. WALLACE in London (in 1823), and subsequently in Dublin (in 1834), and inferred that it is locally irritant or stimulating, according to the amount of dilution, and remotely alterative as regarded nervous power and glandular action. Whether inhaled or applied to the external surface, it is absorbed, as shown and ascertained by Mr. WALLACE and myself, by the state of the urine.

555. *c. Treatment.*—It is chiefly owing to its accidental inhalation in too strong a state of dilution that injurious effects have arisen from this gas. The inhalation of the vapour of warm water, of the spirit of wine, or of ether, has been recommended for the removal of the effects of chlorine; but Dr. PEREIRA states, that he has tried these when suffering himself, without the least benefit. In a case related by KÄSTNER, sulphureted hydrogen was said to have afforded great relief; but this agent should be used with great caution, as it is itself a powerful poison.

556. *B. Chlorate of Potash* was supposed to be an active stimulant and antiseptic, and, in large doses, an irritant poison. I have frequently employed it since 1816, both in public and private practice, especially in the more malignant states of disease, as an antiseptic, disinfectant, and tonic; but I have been much disappointed in its effects, which I have not found such as I expected, or by any means certain. It, however, diminishes the fœtor of the excretions, even those from the skin, as evinced in the putrid and adynamic states of fever, and it is absorbed into the circulation, from which it is excreted chiefly by the kidneys; and it may be detected unchanged in the urine. I have employed it in large doses without obtaining other effects than nausea and vomiting. It appears to be locally irritant, and remotely alterative and diuretic.

557. *C. The chlorides and the hypochlorides of soda and lime* produce effects much resembling those caused by chlorine; but these vary remarkably with the degrees of dilution. In concentrated states they are caustic and irritant; in states of dilution, irritant or stimulant, antiseptic and alterative. I employed these substances largely in practice, especially public practice, when they were first discovered, and found them useful in dysentery and malignant forms of disease; the secretions and excretions in which they remarkably corrected and improved, while they appeared, particularly when aided by appropriate medicines, to support the powers of life. I am, however, unacquainted with injury from the administration of them. When taken in excessive doses they are most likely to occasion gastro-enteric irritation, for which albuminous fluids, the whites of eggs, milk, and oleaginous or mucilaginous diluents are the most suitable remedies. If these salts have been taken in very large quantity, emetics or the stomach-pump may be required; and, after they have been evacuated by these means, these fluids should be abundantly exhibited. Acids must be avoided, lest they should disengage chlorinic gas in the stomach (PEREIRA).

558. *IV. IODINE, THE COMPOUNDS OF.*—The *corrosive* action of pure iodine, and of strong solutions, or rather tinctures of it, has been already considered (§ 179, *et seq.*). It remains only to notice the locally irritant and remotely alterative injurious effects of the compounds of this substance, or of small doses of it, when either too long employed, or given in such forms as produce *slow or chronic poisoning*. The preparations most likely to produce these effects are the *tinctures* and the *iodides*, as the iodide of potassium, or the iodured iodide, the iodide of sulphur, and the iodide of iron. In some constitutions, any of the preparations of iodine occasion, even before a few doses of either are taken, and although the doses are very small, remarkably depressing effects, and generally without any signs of local irritation. I have met with several instances of this very unusual and severe effect of these preparations in practice, and in three of these, the preparations of colchicum were also injurious in very small doses. In general, iodine is not hurtful unless the dose is considerable, or be repeated too frequently, or its use too long continued.—*a. The irritating operation of iodine is most read-*

ily manifested by irritable temperaments and dyspeptic persons. In these, and in other persons in larger doses, it occasions nausea, loss of appetite, cardialgia or heat of stomach, subsequently colicky pains, relaxation of the bowels, diarrhœa, salivation, diuresis, &c. If this substance, or any of its compounds, be still administered, these effects go on increasing, and are attended by soreness of the mouth, severe colic with diarrhœa, emaciation, rapid absorption of the fat surrounding the mammary glands in females; headache, vertigo, sometimes drowsiness or stupor. When iodine is taken in smaller doses, so as not to cause injurious irritation, it acts as a tonic and alterative, and improves both the strength and flesh. But, if too long persisted in, several of the above effects afterward appear.

559. *b. In larger or more frequently repeated doses*, the effects are more severe, and amount to what have been designated *iodism*. These are generally severe vomiting and purging, colicky pains, thirst, and fever; a frequent, small pulse, sometimes a dry cough; cramps of the extremities; rapid emaciation, with occasionally a darker hue of the skin and hair, especially if the iodine has been taken for a long period. In some instances wasting of the manum or testes, and most of the symptoms of chronic gastro-enteritis. It is rare, however, to meet with instances of these effects from iodine, unless it have been given in a most imprudent manner, or too long persisted in, and even then something should be imputed to idiosyncrasy.

560. *c. In still larger doses* the symptoms either approach, or are identical with, those attending the corrosive form of poisoning by iodine (§ 182). When iodinic preparations have either been long continued, or often repeated, especially in large doses, so as to produce not merely an irritant operation, but also a constitutional change—a marked alterative effect, various contingent phenomena, of a more or less severe character, referable either to the nervous system or to the heart and lungs, are apt to appear, especially stupor, tremours, vertigo, faintness, irregularity of the pulse, alarming sinking, shortness of breathing, restlessness, and even death. In these cases the system may be viewed as saturated with the iodine, notwithstanding that the kidneys have been eliminating it from the circulation, as proved by its presence in considerable quantity in the urine; for it has been detected in the viscera and tissues in such circumstances, and even several days after the administration of iodine had been relinquished. The *appearances in fatal cases* have been already described (§ 183).

561. *d. The treatment of the more chronic or acro-alterative form of poisoning by any of the preparations of iodine*, consists in the removal of gastro-enteric irritation by local depletions and counter-irritation. Demulcent and mucilaginous substances should be given with the preparations of opium or of poppy; and starch or emollient enemata, with sirup of poppies or the *tinctura opii composita*, should be thrown up from time to time. Warm baths are generally useful. The diet should be chiefly farinaceous or amylaceous, with or without milk; and during convalescence, the regimen and diet recommended for *gastro-enteritis* and the more inflammatory states of *indigestion* ought to be adopted.

562. V. MERCURY, THE PREPARATIONS OF.—The poisonous operation of the *bi-chloride* has been already considered (§ 215). But life may be destroyed or put in jeopardy by an excessive or prolonged recourse to any of the preparations of this metal.—A. *Fluid mercury* is inert when swallowed as long as it retains its pure metallic state; but it may be slightly oxydized in the alimentary canal, and thus acquire activity, especially if it be long retained in the bowels. Many years ago it was the fashion to swallow fluid mercury, and, more recently, large quantities of it were often given in order to remove obstructions. It rarely, however, produced unpleasant effects from having become oxydized. ZWINGER states, that four ounces occasioned profuse salivation four days after swallowing it; and LABORDE records the case of a man who retained seven ounces for fourteen days, and was attacked with profuse salivation, ulceration of the mouth, and paralysis of the extremities. I was lately called to a man who had taken, some time previously, seven pounds' weight of fluid mercury with a suicidal intention. His medical attendant informed me that it produced a painful sense of weight and constriction in the abdomen, the body having been bent forward; but it caused no farther disorder, and continued to pass off at intervals for some days.

563. It was not unusual, during the last and preceding centuries, to wear belts with fluid mercury around the body for months, or even years; but the practice was not always devoid of harm; for, in some cases, profuse salivation, and other specific effects of this metal, appeared either suddenly or with great severity.

564. B. The injurious effects of *mercurial vapours* have been shown in the article on ARTS AND EMPLOYMENTS, as causing Disease (§ 24, *et seq.*); and the *tremor mercurialis*, with the several cachectic and cerebral symptoms associated with it, is there described. This form of *shaking palsy*—*tremblement mercuriel*—is chiefly met with in workmen whose employments subject them to mercurial vapours. If the emanations still continue to operate, in any circumstance of their evolution, various cachectic symptoms, vertigo, loss of memory, imperfect and unsteady action of the muscles, slight atonic convulsions, and even delirium, epilepsy or apoplexy, terminating in death, are the not infrequent results. Salivation, ulceration of the mouth and gums, hæmorrhages, and emaciation are frequently also produced by mercurial vapours. In 1810, the *Triumph* man-of-war, and a small vessel, received on board several tons of quicksilver at Cadiz. Owing to the rotting of the bags the mercury escaped, and the whole of the crews became more or less affected. In the course of three weeks 200 men were salivated, and two died. All the lower animals in the vessels—cats, dogs, sheep, fowls, rats, mice, and cockroaches—were destroyed.

565. C. The *mercurial compounds* are all injurious, not excepting even the sulphurets, when taken in excessive quantities, or when their use, even in small doses, is very long continued.—a. The local action of mercurials is irritant and alterant; but the *bi-chloride* and *nitrate*s, in states of more or less concentration, pass beyond this state of action, and are, as shown above (§ 215, *et seq.*), caustic and corrosive, al-

though, when very much diluted, they, as well as the chlorides, diminish both irritation and vascularity in the surfaces to which they are applied.

566. b. The *consecutive and remote* operation of mercurials vary with the preparation and the modes of employing it. When taken internally in *small doses*, they promote all the abdominal secretions and excretions, especially the biliary and pancreatic secretions. If the doses be *repeated*, these effects are not only increased, but others are also added; the mucous surfaces and skin manifest an augmented exhalation, the gums become red and tender, the urinary secretion is increased, and the catamenia promoted; absorption proceeds more rapidly, the pulse becomes somewhat accelerated, and the strength slightly impaired. The repetition or number of the doses, as well as the amount of each required to produce these changes, vary with the constitution and idiosyncrasy of the individual, and the amount of action upon the bowels. If the mercurial be continued longer, or after these effects commence, or if the doses be larger than are necessary to produce them, the redness and tenderness of the gums pass into swelling; the tongue, which was at first broad and soft at its edges, becomes flabby and swollen; a coppery taste is perceived in the mouth, which, with the gums, is sore and tender; *salivation*, more or less profuse, supervenes; the salivary glands are tender and swollen, the teeth are loosened, the breath betrays a peculiar odour and fetidity; the pulse is now more accelerated, the strength much impaired, and emaciation more rapid as the salivation proceeds and increases; the quantity of saliva discharged sometimes amounting to several pints in the twenty-four hours. Such may be said to be the *first stage* of chronic poisoning by mercurials, as frequently produced formerly for the purpose of curing certain diseases, especially the venereal disease; but now very rarely required either for this or any other distemper. During salivation, the urine, according to Dr. PEREIRA, does not contain a trace of albumen. The mercurial action alters the secretion of the salivary glands, and causes it to approach more nearly the fluids exhaled from inflamed serous membranes.

567. D. The *first stage* of poisoning by mercurials is generally such as now described; but occasionally other and more serious phenomena appear after a more or less liberal recourse to any of them, and assume the features of *distinct maladies*. An acquaintance with these contingent effects of the constitutional action of mercurials is of great importance to the practitioner. They are not so much owing, in most instances, to the preparation employed as to the idiosyncrasy, or the state of health of the individual; a scrofulous constitution, the venereal taint, and other causes favouring its occurrence. The maladies which may be ranked under the first stage of chronic poisoning by mercury are, *first*, what has been called *mercurial disease*—*Morbus mercurialis*, *hydrargyrosis*, *cachexia mercurialis*, &c., and which presents various forms or states; and, *second*, what has been named *pseudo-syphilis*, or *cachexia syphiloidea*, or what is supposed to be syphilis modified by the mercurial disease.

568. 1st. *Mercurial disease* may be viewed as

the generic appellation of several morbid conditions resulting from mercurial preparations—from a few grains only of blue pill or of calomel in some constitutions, or from large and repeated doses of these or of other compounds of the metal in others.—(a) *Excessive salivation*—*Ptyalismus mercurialis*—*Stomatitis mercurialis*—may occur from a small dose of any mercurial, or from large or excessive doses. It is oftenest met with after small or moderate doses, and is then the result of peculiarity of constitution. The mouth rapidly becomes violently affected; the tongue is swollen so that it hangs out of the mouth, and prevents the patient from speaking and eating; the gums are tumefied and ulcerated, ulceration often extending to the cheeks; the teeth are loosened or drop out, owing to the sloughing of the gums; the salivary glands are enlarged, tender, painful, and the surrounding cellular tissue congested or infiltrated; and the quantity of salivary discharge remarkably increased, sometimes ten or twelve pounds being secreted in the twenty-four hours. With the progress of these symptoms debility and emaciation make rapid progress; and, with sloughing of the gums, caries of the alveolar process not infrequently takes place. If the mercury be continued, involuntary movements of the muscles, or states of incomplete palsy may appear, and the patient sink from extreme vital depression. Even when the mercury is relinquished, the inordinate salivation and other symptoms may still continue, and be arrested with the greatest difficulty. Indeed, such is the case whenever this effect follows the use of a small dose of mercury, and depends upon idiosyncrasy. In some instances, the ulceration and sloughing are followed by contraction of the arches of the palate, and by inability to open the mouth sufficiently. Occasionally the salivary glands become remarkably enlarged, tender, and inflamed, and the surrounding parts swollen (*Parotitis mercurialis*), and the mouth ulcerated, before the salivation commences, the salivary discharge relieving the extreme swelling and pain of the glands; but this most frequently occurs when the patient has been exposed to currents of cold air, or to cold and humidity upon the accession of the mercurial action.

569. (b) *Mercurial Purging*—*Diarrhœa mercurialis*.—Excessive purging occurs sometimes after a moderate dose of a mercurial; and may arise from an excessive accumulation of bile in the gall-bladder and ducts having been suddenly let loose, in which case the evacuations are greenish or dark; or from an excessive secretion of the pancreatic fluid having been produced, and then the evacuations are pale, watery, frothy, or ropy, and are attended by pain, heat, or tenderness in the region of the pancreas. (See PANCREAS, *Diseases of*.) Excessive diarrhœa after mercury has been ascribed by DIETTERICH (*Die Mercurialkrankheit*, Leips., 1837) to a species of pancreatic salivation caused by mercury, and called by him *ptyalismus pancreaticus mercurialis*, or *ptyalismus abdominalis, diarrhœa salivaris*, &c.

570. (c) *Mercurial fever*—*Febris mercurialis*—*F. salivosa*—is generally caused by the excessive use, or by very large doses of mercury, and seldom assumes until after some days. It is attended by dryness of the mouth, redness

and swelling of the gums and tongue, great acceleration of pulse, with restlessness, headache, hot and dry skin; swelling or tenderness of the parotids, sometimes extreme, as already noticed (*Parotitis mercurialis*), and loss of appetite and nausea. This state of irritative fever generally terminates with a profuse salivation, more rarely with purging or sweating, or with some form of cutaneous eruption (§ 574).

571. (d) *Mercurial cachexy*—*Cachexia mercurialis*—is a more frequent consequence of the prolonged use of mercury, and even of the repeated exhibition of calomel, than is generally supposed; and, as far as my own observation extends, it constitutes, in various modifications, the most frequent form of slow poisoning by mercury. It is not infrequently produced by prolonged efforts to affect the salivary glands in the treatment of hepatic or other diseases, and is characterized by the usual symptoms of irritative fever, without flushings, but with great pallor, emaciation, and manifest anæmia. There are, also, loss of appetite, depression of spirits, disordered bowels, with offensive stools; and occasionally swelling of the salivary glands, redness or sponginess of the gums, or ulcerations of them and of the mouth, cheeks, &c., but rarely any salivation. It usually passes almost insensibly into tubercular phthisis.

572. (e) *Mercurial Erythema*—*Erythema mercurialis*.—This alarming affection, thus denominated by Mr. PEARSON, has been viewed by DIETTERICH as adynamic mercurial fever—*Febris mercurialis adynamica*. Since Dr. DIETTERICH wrote, one case of it has come under my observation; and my examination of that case, as well as my recollection of former cases, has not furnished evidence of the acnæcy of this view. The symptoms of this affection are, rapid depression of strength, with a sense of sinking and anxiety, referred chiefly to the præcordia; with partial or general tremour, frequent sighing, universal sense of coldness, and diminished temperature of the surface. The pulse is small, quick, and weak; the countenance is pale, collapsed, and expressive of anxiety and alarm. Vomiting sometimes supervenes, and favours reaction and recovery. In the case just alluded to I could detect nothing, by the aid of the stethoscope, beyond absence of the impulse of the heart, and very weak, frequent, and occasionally irregular contraction. A fatal termination has followed muscular exertion. This affection appears to consist of extreme depression of vital power, and of muscular irritability, manifested chiefly by the heart, and of congestion of the lungs; and hence it might be more appropriately called *Asphyxia cardiaca mercurialis*.

573. (f) *Neuroses Mercuriales*.—Various nervous and mental disorders are sometimes produced by mercury, especially when any of its preparations have been long persisted in, owing to the depressing and alterative action on the nervous systems, probably aided also by other influences. *Melancholia*, sometimes attended by delusions, and various states of partial insanity, in which fears of impending or future calamities more or less predominate, and even sway not only the feelings and sentiments, but also the volitions and actions, are not infrequently produced by a frequent recourse to mercurial preparations. Tremours or trem-

blings (*tremor mercurialis*), sometimes passing into palsy (*paralysis mercurialis*), hyponchondriasis, &c., are also not infrequently occasioned by this cause, and are duly considered at other places.

574. (g) *Various affections of the external surface and of other parts of the body are sometimes produced by an excessive use of mercury; yet it is extremely probable that they are not owing to this cause alone, but to peculiarity of constitution, or to some pre-existing taint or local vice. Certain acute and chronic eruptions on the skin sometimes appear as the effects of mercury; but are now more rarely met with since severe courses of this mineral have been much less frequently resorted to. Eczema mercuriale, Erythema mercuriale, Lepa mercurialis, Erysipelas mercurialis, Hydrargyria, are the names which have been given to an acute eruption which has sometimes appeared during a severe mercurial course, and been attended by considerable danger. This affection has been described by PEARSON, ALLEY, MORIARTY, STOKES, SPENS, CULLERIER, LAGNEAU, RAYER, and others. It generally consists of innumerable minute pellucid vesicles, which give a diffused red appearance to the skin, and a sensation of roughness to the touch: it is generally preceded and attended by more or less febrile disturbance. In two or three days the vesicles attain the size of pin's heads, and the contained serum becomes opaque and milky. The eruption soon extends over the body, and is accompanied by swelling, tenderness, and itching. It usually terminates by desquamation; but a copious discharge sometimes takes place from the excoriated surface; and, with the epidermis, forms large flakes. In some instances the hair and nails fall off, and the eyebrows become denuded (PEREIRA). There is also more or less internal disorder, especially tightness and oppression in the chest, dry cough, with indications of congestion of the lungs and bronchial irritation. ALLEY saw forty-three cases of this eruption in the first ten years of this century, and of this number eight were fatal; more recently RAYER met with only three cases; and PEREIRA only with two. I have seen only two cases, and these occurred at an early period of my practice. Other cutaneous eruptions have been said to be sometimes caused by mercury, especially a *miliary eruption*, *Herpes*, *Impetigo*, *Psudracia*, &c.; but this origin is doubtful, and most probably other causes concur, if not entirely produce them.*

575. h. *Congestions and inflammations of various parts, especially of the eyes, or certain tissues of the eye, as the iris, the retina, the conjunctiva, &c.; congestions and inflammations of the periosteum (mercurial periostitis), and caries of the bones, especially of the more spongy bones; and similar diseases of the pericranium, bones of the cranium and dura mater, have also been ascribed to mercury, but are often owing more to a venereal taint, to the scrofulous diathesis, or to idiosyncrasy, than to this mineral; although exposure to cold, and vicissitudes of temperature and weather in a cold or variable climate sometimes produce those diseases which assume a peculiar character during the mercurial saturation and action, especially when aided by the constitutional taints just alluded to.*

576. 2d. In this way, also, may be explained the several morbid conditions which are comprised under the denomination of *Cachexia syphilitica—Pseudo-syphilis*. The modes, also, of employing mercury in the cure of venereal or other maladies, and the various grades or states of saturation of the system which these modes induce, may have some influence in producing various affections of a peculiar or anomalous character; for it may be anticipated that the large doses of calomel, given in a warm climate, will affect the constitution much less, and somewhat differently from the large inunctions of mercurial ointments, sometimes more or less altered by long keeping, so often employed in this and other cold climates, especially in former times; and that even the blue pill may be so changed by keeping, particularly in hot and humid countries, as to act differently from the recent preparation.

577. E. *Acute poisoning by excessive or large doses of mercurial compounds—by single or repeated doses—is generally attended by symptoms of acute gastro-enteritis; but these, as well as the more remote effects, vary with the preparation administered. In general they are altogether the same as are described when treating of the corrosive operation of the salts of mercury (§ 216–228), or differ merely in severity, and as respects the liability to any of the consecutive effects just described.*

578. F. *Intolerance of Mercury.*—The injurious effects now described are usually produced by a prolonged or an excessive use of any of the preparations of mercury, excepting probably the sulphurets; but in some constitutions very small doses may occasion excessive salivation and some of the other slighter effects, and even a single small dose may have the same result. When salivation follows a single dose it usually appears on the second or third day, and rarely sooner, but occasionally later. It may, however, appear much sooner, and with great severity, considering the dose, when the preparation, as calomel, is allowed to remain in the mouth for some time. In an instance mentioned by Dr. BRIGHT, five grains of calomel put on the tongue in apoplexy, and not washed down, excited in three hours most violent salivation. Dr. RAMSBOTHAM states, that fifteen grains of blue pill, taken in three doses, one each night, produced fatal salivation (*Med. Gaz.*, i., 75). Dr. CRAMPTON records a case where two grains of calomel caused pyalism, extensive ulceration of the throat, exfoliation of the lower jaw, and death. (*Trans. of Dub. Col. of Phys.*, iv., 91.) Dr. CHRISTISON says that three drachms of mercurial ointment, applied externally, caused violent pyalism and death in eight days. (*Op. cit.*, p 379.) I have seen one grain of the bi-chloride divided into twenty doses, of which one was to be taken thrice daily, produce very severe pyalism before more than two thirds of the grain was taken. I have also seen one grain of blue pill cause very serious pyalism; and the same quantity of hydrargyrum cum creta occasion most severe diarrhoea, the smallest doses of any mercurial having this effect with that individual. During the present epidemic influenza (1847), nine grains of blue pill, in three doses, caused sloughing, ulceration of the mouth, and extreme prostration in a case to which I was called.

579. *G.* On the other hand, *some constitutions resist the specific effects of mercury most obstinately.* But it must not be supposed that, although the specific effects do not appear, the mercurial has no effect. It may produce some one or more of the injurious effects above described, or it may affect the bowels, and be carried off by diarrhoea, or excite organic disease of the colon or rectum, especially the latter, or occasion mental disorder with irritative fever. It has also been erroneously supposed that calomel and other preparations of mercury are not injurious to infants and young children, because the specific operation very rarely appears in them. But this is not altogether the case, for the constitutional powers and the digestive organs often suffer more or less, although not manifestly, or at the time; and in older children several of the injurious effects which I have mentioned not infrequently occur, especially ulceration, or even sloughing of the cheeks and gums, and irritative or hectic fever, with remarkable pallor, anæmia, or chronic irritation of the bowels, with enlargement of the mesenteric glands.

580. *H.* *The diagnosis of mercurial salivation* is always difficult, unless the exhibition of some mercurial shortly before the appearance of the discharge be admitted or ascertained. And even when the admission is made, the quantity may be so small as to allow of doubts as to its influence. In certain constitutions, and especially in depressed and debilitated states of such constitutions, after exhausting discharges, and during cold, humid, and northeasterly winds, with more or less exposure to such weather, a small dose of a mercurial may cause excessive salivation; and, if this discharge be attended by much soreness of throat, it is most difficult to determine whether the salivation is actually the result of the mercurial, or merely symptomatic of the sore throat and cold. If it proceed from the mercurial, there will generally be some tenderness of the gums, a soft and flabby state of the sides of the tongue, and it will generally be more obstinate. A patient under my care took, under the circumstances of general health and exposure just mentioned, five grains of blue pill. In two or three days afterward he was attacked with salivation and sore throat. He possessed, however, no constitutional tendency to be affected by mercury; and yet this dose, in his existing state, and from exposure to cold and humidity, appeared to have occasioned the attack, which probably, also, the sore throat aided to develop. When severe and prolonged salivation has been once produced by a course of mercury, a very slight cause may reproduce it a long period after it has ceased. A common sore throat or cold is sometimes alone sufficient to have this effect. But in this case, as well as in others not caused by mercury, there is no mercurial fœtor; for, although the breath is often very offensive in non-mercurial salivation, the peculiar mercurial fœtor is absent. A very severe or even dangerous effect may be produced on the mouth by a very small dose of mercurial, when conjoined with or given at the same time as tartarized antimony or colchicum.

581. *a.* It ought also to be recollected that several medicines and poisons occasionally excite salivation. The preparations of gold pro-

duce this effect as certainly as those of mercury. Those of copper have often a similar operation; and those of iodine and antimony occasionally exert it. Digitalis and prussic acid sometimes occasion the same effect, and even croton oil and opium have increased this secretion; but this operation, as respects these last, has been loosely observed and recorded.

582. *b.* An *idiopathic* or spontaneous form of profuse salivation has sometimes been met with, no medicinal or poisonous cause of it having been detected. Several cases of this form have been recorded, and have continued for months, or even for two or three years, many ounces of saliva having been discharged daily; but in many of these cases the mouth was not affected, and other characteristics of mercurial salivation were wanting. The imagination may excite salivation. Dr. CHRISTISON met with an example of this, which, with other cases of spontaneous chronic salivation, he has noticed in his work. I have seen an instance of profuse salivation follow the contemplation of a disgusting object, but it did not continue longer than a few days. Some of the cases recorded as instances of idiopathic salivation have probably been symptomatic of chronic or structural disease of the *pancreas*, as noticed in the article upon that organ.

583. *c.* Dr. CHRISTISON very correctly remarks, that, in general, mercurial salivation may be distinguished from all other varieties, if its progress has been traced from the first appearance of brassy taste and fœtor to the formation of ulcers and supervention of ptyalism. Its characters are also quite distinct at the time salivation just begins. The fœtor of the breath and sponginess and ulceration of the gums at this stage distinguish it from every other affection. But if the month is not examined until the ulcers have existed several days, the characters of the mercurial action are much more equivocal. They may not, for example, be distinguished from spontaneous ulceration of the mouth, depending upon general cachexia or unsoundness of constitution, and characterized by extensive ulceration, or sloughing, with ptyalism and gangrenous fœtor. The diagnosis of mercurial salivation demands in all cases much attention, not only in a medical or practical, but also in a medico-legal point of view; and, in both regards, there are other questions connected with it which require a special attention.

584. 1st. *May salivation not appear until a long period has elapsed after the administration of the mercury has been abandoned?* Mercury administered in small doses is a cumulative poison, and often produces no effect upon the salivary glands or gums until a certain amount of saturation is produced, this amount varying with different constitutions, or with the same constitution at different times. Hence it may be inferred that mercury may accumulate in the system without producing its specific effects, and may still remain, in some instances, for a considerable period, being unexcreted, or only partially excreted, but, before its elimination is accomplished, a change in the state of vital power, or of the constitution, takes place, or some new influence comes into operation and develops the specific action of the mercury existing in the frame. Thus may be explained

the occurrences of salivation not until some months after mercury has been relinquished. SWEDIAUR has met with instances where the interval was several months; CULLERIE with an instance where it was three months.

585. 2d. *What is the duration of mercurial ptyalism, or how long may salivation continue after the use of mercury has been abandoned?* Rare instances of very prolonged salivation have been met with by most practitioners—instances of even several months' duration. But cases have been recorded by LINNÆUS, SWEDIAUR, COLSON, and others of its continuance for periods varying from one to five or six years. These, however, are very rare. Most commonly the mouth and salivary glands return to their healthy states in the course of a fortnight or three weeks; but it is not unusual to observe the period protracted to a month, or even longer.

586. 3d. *May ptyalism, and other specific effects of mercury, recur after a complete intermission, or, in other words, reappear after having entirely ceased, mercury having been discontinued?* I have above (§ 580) admitted this occurrence. It has not infrequently been observed by those practitioners who in former days were very conversant with the effects of severe or prolonged courses of mercury. Dr. CHRISTISON believes that the occurrence of salivation after two, or three, or four months have elapsed, without the repetition of mercury, is exceedingly uncommon. It certainly is so at the present day; but it most probably was not so many years ago, when prolonged and severe courses of mercury were often prescribed; and that it was not so formerly, the reasons assigned above (§ 584), as well as the testimony of HAMILTON, MEAD, MALE, FORDYCE, COLSON, and others, sufficiently show.

587. 4th. *In what manner does small or other doses of mercury prove fatal?* Death may ensue from the mildest preparations, and even from comparatively small doses, generally in consequence of severe salivation, or of gangrenous destruction of parts of the mouth and fauces, and the vital depression produced by the mineral and by the local disorganization. The most obvious manner in which death takes place is by extension of sloughing, or gangrene, of the throat, mouth, cheeks, face, and neck. This result is seldom seen at the present day; but cases are met with in consequence of peculiarity of constitution, or of large doses given to children under the belief that they are much less susceptible of the specific effects of this mineral than adults. In general, when gangrene is the cause of death, it begins within the mouth or in the throat, and spreads from thence until it reaches the face. This is most frequently seen in children. But I have seen the ulceration both commence in and extend to the pharynx, and thence to the larynx, producing destruction of this latter part, and death. Sometimes, especially in children, the sloughing begins on the external surface, at a distance from ulceration of the gums and mouth, appearing in the course of a few days after salivation. A small vesicle generally appears on the skin, on one or both sides near the mouth, and is succeeded by a gangrenous or sloughing ulcer, which spreads over the cheek, and proves fatal in a few days. In cases of this nature, both

the local disorganization and dissolution are the results of the depression of vital power produced by the mineral. When salivation is excessive or prolonged, death may ensue from the exhaustion thereby produced. But even in this case the mercury has occasioned a poisonous vital depression, the first manifestations of which have been the salivation caused by it; but with this depression, and the exhaustion consequent upon the discharge, the changes produced by mercury in the constitution, and the physical appearances and the alterations of the blood, should be taken into the account. Mercury may also excite pulmonary and laryngeal phthisis, and cause death, as just mentioned, by the ulceration of the epiglottis and glottis, and the attendant exhaustion and hectic. It may occasion a fatal issue by inducing any one of the several affections I have described above (§ 569, *et seq.*) as contingent upon the administration of mercurial preparations. When the corrosive preparations of mercury have been administered, death is generally the consequence of the local corrosive action, of the disorganization caused by them, when taken in large quantity. If this effect is not produced, or is recovered from, they may still cause death from their consecutive effects now described.

588. *I. Of the Physiological Action of Mercury.*—All the preparations of mercury are more or less readily absorbed and carried into the circulation; but it is not ascertained in what state they are absorbed, or by what particular channel, although the lymphatic and lacteal vessels are most probably the chief media. In whatever state the mercurial may be when it has arrived in the blood, it evidently accumulates there, and in the solids, to some extent, especially in some constitutions or conditions of the frame, producing, among others, the effects above described. Having arrived in the circulation, it is carried out of the system, either without deposition or accumulation in the solids, or after having been for a time thus deposited, by means of the several excretories, more especially by the salivary glands, the skin, the pancreas and liver, the intestinal canal, and kidneys. When the mercurial, owing to either the modes of administration or inaction of the excretories, accumulates in the blood, the tissues may be so saturated with it as to give rise to the changes described, or to admit of the detection of it in the excretions, or even in the structures themselves. In whatever state it may exist in the blood, it is so intimately combined with this fluid as to escape detection by the ordinary tests, and destructive distillation is generally required. By this means it has been detected by ZELLER, BUCHNER, SCHUBARTH, COLSON, DIETERICH, and others. In the same way mercury has been found in the *secretions* and *excretions*, in the saliva, the perspiration, the urine, the intestinal secretions, and even in the discharges from ulcers, as shown by CHRISTISON, PEREIRA, and the writers just named. Dr. PEREIRA remarks, that the blackening of the skin mentioned by HARROLD, RIGBY, and others, as having occurred from the use of mercury after the employment of sulphur, shows the presence of mercury in the cutaneous transpiration. The sulphur and the mercury having been thrown out of the system by the skin, and beyond the sphere of the vital power, had en-

tered into union and formed the black sulphuret of mercury, which was deposited on the integument in a pulverulent form. The existence of mercury in the *reguline state*, in the organic solids, has been asserted by some and denied by others. WIMMER, COLSON, DIETERICH, PEIREIRA, and others say that it has been found in this state in the bones, brain, synovial capsules, the pleura, the humours of the eye, the cellular tissue, &c. In what part of the system reduction is effected is not ascertained, or whether it has occurred during life or after death. I have seen the mercury in the fluid state in bones which have been long in contact with the surrounding earth, and have viewed the reduction as a *post-mortem* phenomenon; but it may have been otherwise.

589. Mercurials, having been carried into the circulation, and even to some extent into the tissues and organs, as they undoubtedly are more or less, certainly affect the states of organic nervous and vital power, changing not merely dynamically, but also otherwise *altering* the innervation of the several organs and structures. The *alterative influence* is displayed, and can be estimated only, by its results, by the effects just described. But in addition to the altered state of general innervation, and chiefly as a consequence of it, the blood evinces marked changes. If salivation be easily produced, the blood either shows no very material change at the commencement, or it exhibits merely a slight inflammatory crust. But after salivation has continued some time, the blood becomes darker, coagulates less firmly, and the proportion of the coagulum to the serum diminishes. If salivation be protracted, the red globules decrease in number very remarkably, and *anæmia* is often very considerable, and always supervenes when salivation is either excessive or protracted. DIETERICH says that the electrical condition of the blood changes from the negative, the healthy state, to the positive state. With this change in the blood the soft solids are impaired in their vital cohesion, and all the exhalations and secretions from surfaces and mucous follicles are increased. The heart and lungs are also more or less affected, as Sir B. BRODIE has shown, although more as respects their organic nervous energy, or state of innervation, than as regards the structure. The *structural changes* produced by mercury have been chiefly observed after death from acute poisoning by the corrosive preparations, and have been described above (§ 218).

590. *K. Treatment*.—When the symptoms are those of *acute poisoning* (§ 216), then the treatment recommended for that form should be adopted with promptitude and activity (§ 221); but the varieties of *chronic poisoning* by mercurials require very different measures.—*a. Salivation*, when either excessive or prolonged beyond the intentions of the physician, is that variety which most frequently calls for aid, the means most successful in removing it being also the most beneficial in the treatment of the other varieties of chronic mercurial disease. The patient should be removed to a large, airy, dry, and moderately cool apartment, about 60° Fahr., and entirely apart from those who are subjected to a mercurial treatment. All the linens should be frequently changed, and vicissitudes of temperature avoided. Thus circum-

stanced, the remedial means may consist of three classes, which may be distinguished as the *antidotal or constitutional*, the *derivative*, and the *local*, which may be successively or contemporaneously employed, or in such succession and combination as the peculiarities and form of the mercurial disorder will suggest.

591. (*a*) The *constitutional and antidotal means* are limited; but, such as they are, they should not be overlooked; for, as the injurious effects of mercury, in any of the forms noticed above, often depends upon the actual presence of mercury, in some noxious state, in the circulation, and even in the tissues, and not infrequently upon the irritation this mineral causes in the several emunctories concerned in eliminating it from the system, it is important to resort to such means as are the most likely, by combining with it in the blood and tissues, to render it less deleterious, or even inert. There is probably no substance which may be more beneficially employed with this intention than sulphur, inasmuch as it is readily carried into the circulation, and as readily combines with mercury, whose injurious operation it thus prevents, the sulphuret of mercury being either inert, or nearly so. *Sulphur*, therefore, should be given internally, while *sulphur baths*, both warm and fumigating, or as either may suit the peculiarity of the case, may also be called into aid. Formerly the *sulphurets* were given internally for the removal of excessive salivation, but they are very much inferior to the simple precipitated sulphur, and are now employed chiefly in warm medicated baths. Next to the internal use of sulphur may be mentioned the diluted *sulphuric acid*, taken in quantity sufficient to render the drink pleasantly acid; but in cases of very long protracted salivation, or when *anæmia* has supervened, neither it nor any of the other acids, whether mineral or vegetable, has appeared to me to be of any service, unless combined with an oxide of iron. In these circumstances the sulphate of iron may be taken in small doses, dissolved in the drink acidulated with the sulphuric acid, or the citrate of iron may be given in fluids containing the citric acid. In treating most of the injurious effects of mercury, the local mischief, in whatever form it may appear, attracts the chief notice, and to it chiefly, and not to the states of the blood and of vital power, which are of the greatest importance, are our remedial measures directed. Various other constitutional means have been recommended; but there are comparatively few which deserve adoption. The most serviceable are the preparations of sarsaparilla; those of iodine; the iodide of iron, and some other combinations of iodine with sarza; the decoction of cinchona, or the sulphate of quinine with sulphate of iron, or common alum, or with the citrate of iron, according to circumstances, or to the amount of debility or of *anæmia*. In most of the remote or consecutive states of poisoning by mercury, and more especially in mercurial cachexia and affections of the skin, and mercurial periostitis, the iodide of potassium and other preparations of iodide, with sarza, &c., will prove most beneficial.

592. (*b*) The *derivative measures* which are most serviceable are purgatives and warm baths, and these are serviceable chiefly when salivation has occurred suddenly or unexpected-

edly; when it is recent, and the patient not much reduced. In these circumstances, the best purgatives are the neutral sulphates dissolved in the compound infusion of roses, to which some additional sulphuric acid, and small doses of the sulphate of iron, may be added; these may be administered at intervals, so as to keep up an action on the bowels, or a full dose of precipitated sulphur may be taken at bedtime, and the saline aperient in the morning and at midday if it be required. Warm medicated baths may likewise be used, or pediluvia. If constipation continue, or become obstinate, other more active purgatives may be required, if a recourse to purgative enemata does not accomplish fully the object entertained.

593. (c) The local means should have reference to the state and stage of salivation, and of the other symptoms. If salivation be commencing; if it be acute; if it have occurred unexpectedly, or from a small dose of mercury, and be attended by an inflammatory state of the mouth or salivary glands, the topical remedies ought to be soothing, and the local excitement should be calmed by means of demulcent gargles, containing cooling and anodyne substances, as the nitrate of potash, or the hydrochlorate of ammonia, with extract or tincture of opium; or by gargles containing the acetate of lead and acetic acid, with tincture or wine of opium. If the swelling and tenderness around the salivary glands be considerable at the commencement, a few leeches, followed by fomentations, may be prescribed, and the other means assiduously employed. In the more chronic or atonic stage or state of salivation, the gargles should be astringent and tonic, as the decoction of cinchona, or of oak bark, with alum and sulphuric acid, or with the tincture of krameria. The chlorides, especially the chloride of lime in solution, with creasote; solutions of the chloride of zinc, or of the nitrate of silver; the tincture of myrrh in camphorated demulcents, &c., may severally be employed as gargles. I have seen strong tar-water of great service when used as a gargle, a weaker form of it having been drank as a constitutional remedy.

594. (d) The other varieties of chronic poisoning by mercury are benefited most by the constitutional or antidotal means advised above (§ 591). But, in these varieties, the states of the blood and of nervous energy should receive particular attention. In order to remove the existing depression of vital power, to improve the assimilating processes, and to resist the changes in the blood, especially the progressive anæmia, the iodide of iron in sirrup of sarsaparilla, the several preparations of iron, or the mineral chalybeates, in states of combination which the peculiarities of the case will suggest, and many of the usual vegetable or mineral tonics and antispasmodics, will prove of essential service. When the nervous system, or even when the mental manifestations betray disorder, the means just mentioned, preceded or attended by the constitutional treatment above recommended (§ 591), are then also required; change of air and scene, travelling, a dry, bracing air, generous but light diet, aided by occasional recourse to tonics, to chalybeates, to the iodine, and to the natural mineral waters, being also beneficial.*

595. vi. STRAMONIUM—THORN-APPLE—*Datura Stramonium*.—Poisoning with this plant is not infrequent, and is generally accidental. But the thorn-apple has been used on the Continent for the purposes of aiding the commission of crimes. The whole plant is probably poisonous, but the seeds are the most virulent. It is very slightly irritant, its poisonous action being exerted chiefly on the brain and nerves of sensation. Its operation nearly resembles that of belladonna. The active properties of the plant reside chiefly in an alkaloid principle, described by GEIGER and HESSE, and named *daturia* or *daturium*; and probably partly in an empyreumatic oil which it contains, resembling that of digitalis. It acts chiefly by absorption, and probably also by its local influence or impression on the nervous systems; for the application of the leaves of the plant to burns or sores has occasioned dangerous effects.

593*. a. The symptoms produced by stramonium have been most accurately observed and described by Dr. PEREIRA. In small and gradually increased doses, it impairs sensibility, thereby alleviates pain, and hence is *anodyne*. Although it allays pain, it does not usually produce sleep. Dr. PEREIRA remarks that it has no direct tendency to induce sleep, and hence it *cannot be called soporific*; but indirectly, by alleviating pain, it often disposes to sleep. It usually does not affect the pulse: it slightly and temporarily dilates the pupil, and has no tendency to cause constipation, but rather relaxation. In larger doses it causes dryness of the throat, thirst, nausea, giddiness, dilatation of the pupil, obscurity of vision, headache, nervous agitation, disturbance of the cerebral functions, perspiration, occasionally relaxation of the bowels, and sometimes diuresis. In fatal doses the chief symptoms are flushed countenance, delir-

remedy and as a poison, supersedes additional matter on the subject; yet on a topic so prolific in relation to a mineral remedy, the use of which has for near a century past been so extensive in the hands of the faculty of American physicians, an additional observation or two may be made. In specific febrile disorders, it is well known that OGDEN, of Long Island, and DOUGLASS, of Boston, had recourse to mercury before its use for those purposes was made in Great Britain. In the mercurial practice for yellow fever, as it prevailed in Philadelphia in 1793 and in subsequent years, and in New York in 1795, 1798, and in 1803, as adopted by the medical men of that metropolis, great opportunities occurred of noticing the action of this powerful agent in a disorder of acknowledged specific character; while the abuse of mercury in syphilitic diseases has been the theme of repeated remark and of professional notoriety by American prescribers. The reader will do well, on all these subjects, to peruse the valuable volume on the mercurial practice of the United States by the late Dr. JOHN WARREN, of Boston. See, also, the *Massachusetts Medical Communications*, vol. ii. On this most interesting subject, the use and abuse of mercury, a work of clinical value appeared so long ago as in 1811, entitled a *Dissertation on Mercury*, by JOHN W. FRANCIS, New York. This elaborate essay contains many details of value relative to the medical history and curative action of this heroic prescription. The author considers the several forms of mercurial erethism as more likely to occur from the external applications of the remedy than from its internal use. He notices the loss of memory for years, arising from the too free introduction of mercurial salts into the system; and ingeniously contends that mercury as a curative agent effects its great design by its universally stimulating or exciting action, and its alternative influence in eliminating specific disease by unblocking all the excretories of the body. The recent doctrines of LIEBIG, now so popular, seem to have been fully broached in this treatise by Dr. FRANCIS. The assimilating principle in elucidation of the action of small-pox, venereal disease, &c., gives unquestionably a comprehensive view both of the action of animal poison as a taint, while a like doctrine of the corrective influence of certain remedies unfolds a lucid theory of their therapeutical action.]

* [The elaborate exposition which our author has given of the various disordered changes induced by mercury, as a

ium—usually maniacal—dilatation of the pupil, dryness of the throat, loss of voice, difficulty of deglutition, hot, perspiring skin, convulsions, and sometimes palsy. But the symptoms vary in different cases with the dose, and the part or preparation of the plant administered. Of the numerous instances of poisoning by this plant, the following will suffice to illustrate the symptoms:

594*. In two cases related by VICAT and SWAINE, the chief symptoms were furious delirium and palsy of the extremities. In three instances adduced by ALIBERTO there were delirium, restlessness, constant incoherent talking, dancing, and singing, with fever and flushed face. In a case described by Dr. TRAILL, about eighteen grains of the extract were taken by mistake, and were followed by dryness of the throat, giddiness, dilated pupils, flushed face, glancing of the eyes, incoherence, resembling intoxication, and incessant, unconnected talking, like that of demency. Emetics were given without effect, and little amendment was obtained from blood-letting, cold to head, or purgatives. But after a glass of strong lemonade vomiting took place, and the patient soon recovered. BOERHAAVE states, that a man gave the powder of stramonium in coffee to a female. It occasioned redness of the features, delirium, nymphomania, loss of speech, followed by fixedness of the eyes, tremours, convulsions, and coma; afterward tetanic spasm and slow respiration. She was with difficulty roused by the action of emetics, and recovered. In another dangerous case, adduced, among others, by Dr. CHRISTISON, free blood-letting effected a speedy cure. Of a case well described by Mr. DUFFIN, the symptoms were exactly as above stated (§ 593*). One hundred of the seeds were swallowed; but, although the treatment was judicious, death took place in twenty-four hours. Of several cases adduced by GMELIN, six hours were the shortest duration. [It is not uncommon to observe hemiplegia with spasmodic affections of the opposite side in children who have eaten the seeds or flowers. I recently attended a child, a boy twelve years of age, who was poisoned by inhaling the aroma from the leaves that had been bruised in the sun. After exposure to these fumes for a considerable period in a hot sun, he was seized with maniacal, wild, hysterical delirium, contracted pupil, &c., and, in spite of treatment, died in about twelve hours. On dissection, the blood was found fluid, the brain congested, the other organs natural. For many cases of poisoning by this plant, see my edition of GUY'S *Med. Jurisprudence*, p. 697.]

595*. *b. Diagnosis.*—VOGHT says, that stramonium is distinguished from belladonna by its affecting more the ganglia, spinal cord, and brain; by the circumstance of the pulse being little affected by it, and by slowness more frequently than acceleration of pulse being produced by it; and by its exciting the organic nervous system more strongly, and more directly promoting all the secretions, especially those from the skin. Its operation may be briefly characterized as slightly irritant and energetically alterative as regards sensibility and innervation, while it influences less remarkably the irritability of muscular structures.

596. *c. The morbid appearances* consist chief-

ly of congestion of the brain and sinuses, especially in those cases which terminate early with maniacal excitement and determination to the head. When life has endured for eighteen hours or upward, the congestion within the cranium is less remarkable. In Mr. DUFFIN's case, the brain was healthy, and not congested. The stomach and intestines were natural. There were a slight redness over the pharynx, larynx, and upper third of the gullet, thickening and swelling of the rima glottidis, and a semi-coagulated state of the blood.

597. *d. The treatment* should consist chiefly of vascular depletions; the cold or tepid affusion on the head; emetics or the stomach-pump; lemonade drinks; and the other means advised for *belladonna* (§ 545).

598. CLASS VII. NARCOTICS, OR STUPEFYING POISONS. — HYPNOTICS. — Several substances have been classed as narcotics, although they are not directly or really narcotic or hypnotic, and produce this effect only contingently upon their anodyne or sedative action—not infrequently as a consequence of the vital depression or exhaustion which they occasion in a large dose. This error of arrangement, so intimately allied to inaccurate views as to the operation and effects of both medicines and poisons, has been perpetuated by most writers on juridical medicine. But it is of great importance, in a practical rather than in a theoretical point of view, that substances which are simply *anodyne*—which remove pain or paralyze sensibility—should be distinguished from those which exert a more extensive effect, and are *sedative*—which lower nervous and vascular excitement, and depress vital action; and that those substances which are simply *hypnotic*—which merely procure sleep—should also be distinguished from *narcotics*—which do more than procure sleep, which stupefy the senses and occasion a state of lethargy, into which the patient lapses immediately after having been momentarily and with difficulty roused. There is no doubt that several substances produce effects so complicated as to render classification founded on these effects most difficult; that there are some which are not only anodyne, but also sedative or depressing, and withal both hypnotic and narcotic; and it is hence the more difficult to arrange them. Still the difficulty should be met; and, by careful observation, the more prominent effects of these substances should be recognised and assigned to each. I have had occasion to show that several substances which have been classed as narcotics are not actually such, but occasionally manifest more or less of this effect merely as a consequence of the vital depression they produce when taken in excessive doses.

599. The operation of narcotics was once a source of dispute between the chief supporters of the medical doctrines adopted toward the close of the last century. The term *narcotic*, being applied substantively and adjectively to medicines which have the power of stupefying and impairing the energy of the nervous system, the mode in which this power was excited became the subject of inquiry. As most narcotics have a stimulating influence in small doses, and as the narcotic effect is produced chiefly, or only when they are given in full or large doses, the question was, as to the way in

which this latter effect was developed. CULLEN contended that the stimulating effect is owing to the resistance offered by the *vis medicatrix nature* to the sedative influence of the substance; and hence that a large dose is immediately sedative, because this resistance is overpowered. BROWN, on the contrary, maintained that narcotics are in reality highly diffusible stimuli, which exhaust the excitability by the rapidity of their action. Thus CULLEN regarded them as directly sedative, and indirectly stimulant; and BROWN as directly stimulant, and indirectly sedative. The discussions connected with this subject, which may be viewed as constituting an epoch in the history of medicine, are now nearly forgotten, although the topic is not altogether destitute of practical importance. If both doctrines were closely investigated, neither would be found correct; but it is sufficient that we attend to the effects, and observe them correctly. The exact modes in which they are brought about require too minute an investigation to be entered upon at this place.

600. I. CARBONIC ACID GAS, and *Admixtures of it with other Gases*.—This is the most important of the deleterious gases. It is, as Dr. CHRISTISON remarks, the daily cause of accidents; for it is extricated in great quantity from burning fuel, during the calcination of limestone or chalk, by the fermentation of beer, and in pits, mines, wells, &c. It is generated during respiration by all animals, and is accumulated to a dangerous amount in apartments where due ventilation is neglected. Owing to these and other sources, being such as admit of the accidental and intentional operation of this gas on the human subject, poisoning by it is of frequent occurrence. Some doubts had been entertained whether it is a positive poison, or simply an asphyxiating gas. But, independently of its action, when concentrated or pure, in irritating and constricting the larynx, and thereby producing suffocation, it is positively and energetically poisonous. This is shown by a variety of circumstances: 1st. Poisoning by this gas is more rapid than immersion in hydrogen or azote. Immersion in carbonic acid gas will kill an animal outright in twenty-five seconds, and a small bird in fifteen seconds. 2d. If, instead of the nitrogen gas contained in air, carbonic acid be mixed with oxygen in the same proportion, symptoms of poisoning will appear in two minutes in animals which breathe this admixture. Persons have become apoplectic in an atmosphere containing carbonic acid gas in much less proportion, and which has appeared quite respirable upon first entering it. 3d. Professor ROLANDO (*Archives Gen. de Med.*, t. v., p. 132) found that the land tortoise sustained little injury when the great air-tube of one lung was tied; but instead of tying this tube, he contrived to make the animal breathe carbonic acid gas through it, and death took place in a few hours. 4th. The symptoms caused by inhaling the gas much diluted may be produced by the application of it to the internal surface of the stomach, or even to the skin. It is well known that aerated water not infrequently causes giddiness and a passing intoxication when drank too freely, especially by persons unaccustomed to it. The sparkling wines owe to this gas a portion of

their power of rapid intoxication. M. COLLARD DE MARTIGNY found that, if the human body be enclosed in an atmosphere of this gas while respiration is carried on by the common air, the usual symptoms of poisoning with carbonic acid is produced; and, if the same experiment be made on animals, death will ensue if continued long enough. 5th. It has been shown by Dr. G. BIRD that death may follow the inspiration of this gas, although the usual changes are produced by the oxygen in the air on the blood, which even may still retain its florid colour (*Guy's Hosp. Rep.*, vol. iv., p. 79.)

601. A. When a person attempts to *inhale pure carbonic acid gas*, the throat is irritated so strongly that the glottis closes, and inspiration is impossible. Sir H. DAVY and Dr. CHRISTISON remark, that the gas causes an acid taste in the mouth and throat, and a sense of burning in the uvula; hence, when a person is immersed in this gas, he dies at once of suffocation. The effects, however, are very different when the gas is diluted, the symptoms resembling those of apoplexy or poisoning by opium, but varying somewhat according to the source from which the gas is derived, and the vapours or other gases or admixtures consequently breathed with it. It is of importance to recollect that fatal poisoning by this gas may occur where the quantity present is quite insufficient to produce much effect at first, or for some time, or to extinguish a lighted candle; and, consequently, we are authorized in concluding that a gaseous mixture, capable of extinguishing a lighted taper or candle, will almost inevitably prove fatal to animal life. No odour nor taste, also, is perceived when this gas is much diluted.

602. B. The *symptoms* experienced by persons exposed to an atmosphere loaded with charcoal fumes, or with carbonic acid emanating from any other source, and mixed with more or less of other gases, are well marked and constant; although, as Dr. GOLDING BIRD remarks, they are far from being distinctly characteristic of the existing cause, as they are very similar to the premonitory signs of apoplexy. A person exposed to these fumes at first experiences an intense, penetrating, and throbbing headache, with a sense of weight and heat, especially about the occipital region; pulsation in, and sense of tightness across the temples; giddiness, confusion of ideas, and failure of memory; increased action of the heart, and often violent palpitations, sometimes attended by a disposition to nausea and hysterical sobbing. If the individual be now removed into a current of cool, pure air, with warm applications to the feet, which usually, in such circumstances, become cold, the symptoms gradually vanish. But if he continue exposed to the poisoned atmosphere, a buzzing noise in the ears, partial or total loss of vision, an undefined, vague feeling of intense dread or horror succeed, and are rapidly followed by somnolency or syncope. Subsequently, according to Dr. G. BIRD, all power of volition disappears; the pulse, which was previously above one hundred, falls to forty or fifty; respiration becomes slow and laborious; the surface universally cold, and often livid; the lips blue or violet; the eyes retaining, in most cases, their lustre. Gradually these symptoms increase in intensity, frequently with the accession of te-

tanic convulsions, and, in a few instances, raging delirium. White or bloody foam appears before the mouth and nostrils, vomiting takes place, and the sufferer sometimes expires in the act; but he as frequently breathes his last without vomiting, and, in this case, the tongue is protruded, or firmly clinched between the teeth. He is usually found in a calm and sleep-like attitude, the countenance always retaining a placid expression, which even the vomiting, that often occurs in the last moments, had not disturbed.

603. Persons who have been exposed to an atmosphere vitiated by carbonic acid gas, "until insensibility, cessation of pulsation in the smaller arterial trunks, and suspension of respiration supervene, frequently exist for a considerable time, if removed from the poisoned atmosphere, appearing partially to survive, exciting hopes too frequently fallacious; as such persons almost always sink, even after living for several days in a state of somnolency." A case, however, is recorded by Dr. BABBINGTON, in which a singularly judicious treatment was successful; and others have since recovered from this very dangerous state.

604. *C.* A small quantity of the mixed gases, proceeding from the slow combustion of tallow or oily substances, will produce dangerous symptoms. Dr. BLACKADDER ascertained (*Edin. New Philos. Journ.*, i., 224) that the vapour into which oil is resolved, previously to its forming flame round the wick, excites, even in minute quantity, intense headache. The emanations from the burning snuff of a candle are probably of the same nature, and very poisonous; and an instance of such effect is adduced by Dr. CHRISTISON. A party amused themselves by holding under the nose of a boy asleep the smoke of an extinguished candle. At first he was roused a little each time; but after half an hour, during which this was repeated, he began to breathe laboriously, and was attacked by incessant epileptic convulsions, and died on the third day. The effects of these emanations are probably partly owing to the presence of an empyreumatic volatile oil, which is an active poison (§ 668).

605. *D.* The admixture of sulphurous acid gas with the carbonic being inhaled in a diluted state, is extremely deleterious. When, however, the sulphurous acid gas is present in any quantity, the irritant effects produced by it, especially on the lungs and air-tubes, will often prevent accidents which might have occurred if carbonic acid gas only had been present. Instances have been recorded where the admixture of these gases have proved fatal, especially in mines. The symptoms produced by these gases, and those caused by the gradual contamination of the air in a confined apartment in which a number of living beings are enclosed, are very nearly the same, although the causes are not identical. It was found in the instances which occurred in mines, that, although the lights continued to burn, the men were poisoned; the symptoms being difficulty of breathing, pain and beating in the head, giddiness and ringing in the ears, palpitation and anxiety followed by vomiting, weakness and pains in the limbs, and, finally, loss of recollection. To these succeeded frantic delirium in some, terror in others, and insensibility in the rest. Many

retched and vomited. In some the pulse was quick, in others it was slow; in many irregular, and in all feeble. (*See Edin. Med. and Surg. Journ.*, xiii., 353; xxxii., 345.)

606. *E. Appearances of the dead Body.*—*a.* Externally, these vary with the circumstances of particular cases; but the surface is generally sprinkled with livid spots, often bluish or reddish brown, passing into violet; and these are most numerous in the most depending parts. The limbs are in some cases very flexible, in others as rigid. The fingers are often irregularly bent, sometimes stiff and extended. The arms are occasionally thrown across the chest, especially if spasms have preceded death. Opposite statements have been made as to the persistence of the animal heat, and as to the rapid or slow development of decomposition. The tongue is found projecting, and often clinched between the teeth, unless vomiting preceded death, and then it is usually in its natural position. The mouth is often covered with a white or bloody foam. The face is in some cases red and bloated, in others pale and placid. The eyes generally retain their vivacious aspect; they are sometimes injected. The pupils are dilated. The features are always in a state of repose. The interior of the nostrils, in some instances, are lined with a black, fuliginous deposit. The abdomen is distended with air. (*Dr. G. BIRD.*)

607. *b. On dissection*, the coverings of the head are found injected with blood. The vessels of the dura mater, arachnoid, and pia mater, as well as the sinuses, are found turgid with blood; and serous effusion often exists beneath the arachnoid. The surface of the brain is always injected, often reddish; occasionally the cerebral substance is somewhat softened, and presents the appearance of recent inflammation. The lateral ventricles generally contain fluid, sometimes limited to one side; and serous effusion is met with at the base of the brain. In addition to this congested state of the brain and cerebellum, extravasation of blood is found in a few instances; in one case, universal effusion of blood between the arachnoid and pia mater, and extending to the cerebellum; in another, into the lateral ventricles. Dr. G. BIRD states that the blood found in the cerebral vessels is black in some cases, and florid in others; and even black in some vessels, and florid in others, in the same case. Occasionally the blood is fluid, and very thick; in others remarkably thin, and in some coagulated. Effusion of reddish serum into the *pleura* and *pericardium* is frequent. The *lungs* are sometimes expanded, and full of air and blood; in others, collapsed. In many, their tint is blackish violet; in others, red, spotted with black; and in some, quite natural, and presenting merely the usual cadaveric turgescence and blackness posteriorly. The blood in their vessels is often black, sometimes florid, and even both; the vessels are frequently turgid, but occasionally nearly empty. The cavities of the *heart*, and the blood found in them, present as opposite appearances, in different cases, as have been described in respect of the lungs. The same remark applies to the larynx and trachea. The pharynx and œsophagus are usually healthy, and sometimes contain food, as if the patient had expired in the act of vomiting; but in the

last moments of life, the contents of the stomach are regurgitated without effort rather than vomited. The *abdominal viscera* are generally healthy, whatever lesion they present being referable to other causes. The veins are most usually congested, and more or less of serous effusion into the peritoneal cavity is sometimes seen. The blood in the abdominal veins is coagulated in some cases, and fluid in others. The *muscles* are stated to be extremely lacerable, owing to the absence of irritability of vital cohesion; but Dr. G. BIRD contends that such is not the case in some.

608. *F. The Modus Operandi of diluted Carbonic Acid Gas.*—This physician, who has paid much attention to the subject, concludes, from his researches, that an atmosphere containing carbonic acid gas will produce death, although it may contain a sufficient amount of oxygen to support life, *per se*, and to allow the arterialization of the blood to proceed. On which account, no dependence can be placed on the dark or florid colour of the blood, as arguments for or against poisoning by carbonic acid gas. He considers that this gas, when diluted, acts primarily upon the nervous system; and secondarily, but by no means essentially, upon the circulating fluid; that death is caused by the accession of apoplexy, often attended by serous effusion into the ventricles, or on the surface of the brain, and sometimes even by the extravasation of blood; and that no importance can be attached to the states of the surface, of the features, of the blood, of the limbs and muscles, and of the thoracic and abdominal muscles, as proofs of poisoning by carbonic acid gas. I need only add to this statement, that during the inhalation of this gas, or of admixtures of it with other gases, the injurious action may be produced not only through the medium of the nerves, but also by the passage of the gas itself into the circulation, where it may act more directly on the ganglionic nerves of the brain, influencing its innervation, its circulation, and vital manifestations, and thereby giving rise to the symptoms and structural lesions above described. These lesions are chiefly congestion of the vessels of the brain, with contingent serous effusion, and, more rarely, sanguineous extravasation. Beyond these, but little structural change, at least of a precise and obvious nature, is met with, either constantly or generally, although various alterations in the colour and states of both the fluids and soft solids are observed; but they are so different, or even opposite, in different cases, that no importance can be attached to them.

609. *G. Treatment.*—This should consist of cupping or general blood-letting, but cupping on the nape of the neck generally, and preferably; of an occasional recourse to cold or tepid affusions on the head and neck; of the application of derivative means to the lower extremities, and of stimulative embrocations to the chest and limbs; and of the administration of enemata, containing camphor, asafœtida, with active purgatives, as turpentine, castor oil, &c. The quantity of blood which should be taken by cupping ought to be regulated by the symptoms and the progress of the poisonous effects. When these means are inefficient, owing to the existing torpor and insensibility, artificial inflation of the lungs and even re-

course to electricity, or to electro-galvanism, should not be neglected, more especially as the progress of such cases is not generally so rapid as to preclude the adoption of these means. When the temperature is much depressed, warm baths, with salt, mustard, &c., in the baths, should not be neglected. In Dr. BABINGTON'S case, decided benefit was derived from the inhalation of oxygen gas. But much will depend upon the adaptation of the various means to the states of the nervous system and of the circulation at the time of their administration. As many of the cases of poisoning by this gas are of considerable duration, sufficient time is generally afforded to ascertain the efficacy of remedies.

610. ii. *CARBONIC OXIDE GAS.*—When this gas is thrown slowly into the veins, it gives the arterial blood a brownish tint, and induces, for a short time, a state resembling intoxication (NYSTEN). But it is certainly more deleterious than the experiments of NYSTEN would seem to indicate. An assistant of Mr. HIGGINS, after inhaling this gas two or three times, was seized with giddiness, tremours, and approach to insensibility, succeeded by languor, weakness, and headache. Another assistant, having previously exhausted his lungs, inhaled the pure gas three or four times, and was suddenly deprived of sense and motion, and continued insensible for half an hour, during which time he was apparently lifeless, with the pulse nearly extinct. Various means were tried for rousing him, without success; till, at last, oxygen gas was blown into the lungs. Animation then returned rapidly; but he was affected for the rest of the day with convulsive movements, stupor, violent headache, and quick, irregular pulse; and after his senses were restored, he suffered from giddiness, blindness, nausea, alternate heats and chills, succeeded by feverish, broken, but irresistible sleep.

611. iii. *CARBURETED HYDROGEN GAS—COAL GAS.*—The several species or admixtures of carbureted hydrogen gas are more or less narcotic and injurious, although much less noxious than sulphureted hydrogen.—A. Sir H. DAVY found that, when he breathed a mixture of two parts of air and three of carbureted hydrogen, he was attacked with giddiness, headache, and transient weakness of the limbs. When he breathed this gas in a pure state, the first inspiration caused a sense of numbness in the muscles of the throat; the second, an overpowering sense of oppression in the chest, and insensibility to external objects; during the third, he felt sinking into death, and the mouth-piece dropped from his hand. On recovering his senses, which happened in less than a minute, he continued to suffer for some time from a suffocating feeling, extreme exhaustion, and feebleness of the pulse. Throughout the rest of the day he was affected with weakness, giddiness, and rendering headache. Colliers, however, breathe the air of coal-mines without apparent injury, although strongly impregnated with this gas; and NYSTEN found it inert when injected into the veins. Probably the concentration of the gas, or the impregnation of the air with it, requires to be carried up to a certain point before its poisonous operation is produced.

612. *B. Coal gas and oil gas*, which are mixed and variable gases, appear to be inert, or

nearly so, when very much diluted; but since their introduction for the purposes of illumination, many fatal accidents have occurred from the respiration of air contaminated with them. Coal gas consists of hydrogen, proto-carburetted hydrogen, bi-carburetted hydrogen, carbonic oxide, nitrogen, and carbonic acid in varying proportions. Several cases of poisoning with this admixture, owing to the contamination of a large proportion of air with it, are recorded. The symptoms were vertigo, cephalalgia, confusion of intellect, with loss of consciousness; nausea, with vomiting; general weakness and vital depression; partial paralysis, convulsions, and the usual symptoms of general asphyxia. In illustration of the effects of coal gas, Mr. TAYLOR adduces the following: In January, 1841, a family in Strasburg respired for fourteen hours on air contaminated with coal gas, owing to its escape from a pipe. On discovery of the accident four persons were found dead. The father and mother still breathed; but the father died in twenty-four hours: the mother recovered. An old lady and her granddaughter, who had been annoyed by the escape of coal gas during the day, retired to bed, and were found dead about twelve hours afterward. In the case of the Strasburg family, there was probably not more than 8 or 9 per cent. of coal gas contained in the air of the rooms, because, when the proportion is a little greater, the mixture with air becomes explosive; and a candle was burned out, and a fire burning in the stove, showing that no explosion had taken place. In the other cases, a strong smell of coal gas could be perceived when the bodies were found, though the air could be breathed. Coal gas, therefore, like other gaseous poisons, may destroy life if long respired, although it be so much diluted as not to be injurious at first, or for a short time.

613. *C. On dissection*, the appearances have been observed chiefly in the instances just mentioned. Of the five bodies poisoned by this cause in Strasburg, the *post-mortem* examination evinced a great difference in the appearances; but the chief alterations were congestion of the brain and its membranes, remarkable engorgement of the pia mater, and intense redness of the whole surface of the brain. In three of the cases there was an effusion of coagulated blood on the dura mater of the spinal canal. The lining membrane of the air-passages was strongly injected; and there was spread over it a layer of thick, viscid froth, tinged with blood. The substance of the lungs was of a bright-red colour, and the blood was coagulated. In the other cases, recorded by Mr. TEALE (*Guy's Hosp. Rep.*, No. viii.), there was also congestion of the brain and its membranes, with injection of the lining membrane of the air-passages; but in these cases the blood was remarkably liquid.

614. *D. Treatment*.—The odour of this gas will generally lead to the detection of it, and to prevention of its injurious operation; but it may penetrate into dwellings and apartments in a very insidious manner; and if this takes place where persons are asleep, the results may be fatal in a few hours. The exact proportion of this gas to the air respired which will destroy life has not been ascertained; but from 7 to 12 per cent. of this gas in air will most like-

ly be sufficient, as this proportion has killed rabbits and dogs in a few minutes. Indeed, a quantity a little below the explosive proportion, or 7 or 8 per cent., may be sufficient. The treatment where poisoning has taken place is the same as I have advised for the effects of carbonic acid gas (§ 609).

615. *iv. CHLOROFORM*.—*Perchloride of Formyle*—*Chloric Ether*, and *Ether Vapour*.—I have already made mention of *ether vapours* (see § 322, 336–340) in connexion with their effects as an *intoxicating* and *paralyzing* or *anæsthetic agents*. I shall now notice them as powerful *hypnotics* or *narcotics*, their hypnotic operation being the most speedily developed, and the most remarkable of known substances. When the effect of sulphuric ether as an anæsthetic agent was first ascertained, the advantages to be derived from it in surgery and midwifery were certainly over-estimated, and the dangers contingent on a recourse to it were not always admitted or even recognised. It certainly could not have furnished entire satisfaction to Dr. SIMPSON, who was among the most zealous in recommending it in obstetric practice, otherwise he would not have sought for another anæsthetic agent; and he was successful in finding one still more energetic, and probably more safe. [We know not how to reconcile these two qualities. In proportion to the energy of the article is its danger, unless properly used. This is especially the case with chloroform, as experience has fully proved. We cannot, from present experience, therefore, justify its use as an anæsthetic agent, especially in natural labour, which is safer in proportion as it is a *natural process*.] But a few months of trial of the sulphuric ether inhalation was thus followed by the discovery of the advantages of inhaling *chloroform*. In February, 1847, Mr. JACOB BELL first employed chloroform, or perchloride of formyle (*Pharmaceut. Journ.* for February, 1847, p. 357), as a substitute for sulphuric ether, as an anæsthetic or hypnotic agent; and in November, 1847, Dr. SIMPSON, apparently unacquainted with Mr. BELL's recommendation, had recourse to it for the alleviation of the pains of parturition. That chloroform, even in small quantity, poured upon a sponge or handkerchief, and held to the nostrils, produces the most profound sopor and insensibility in a very short period—from a few seconds to a very few minutes—cannot be disputed; and that it may be employed in surgical operations and in midwifery, so as to prevent any painful sensation, has been already shown on numerous occasions. It has likewise been proved that it is more rapid and certain in its effects than sulphuric ether, and even more safe, thus admitting that the latter is not always quite harmless. [We cannot subscribe to the truth of this remark; we believe that facts show directly the reverse. We have now more than twenty fatal cases on record from the use of chloroform, in the short period since its introduction (March, 1848.)] I have already pointed out the dangers attendant upon even a prudent recourse to sulphuric ether inhalation, especially in the parturient process (§ 337, 338), and I have no reason to infer that the danger is much reduced by the employment of chloroform. Time and close observation will decide as to the amount of benefit or of mischief which may result from the use of this

latter. That it may be applied to injurious, to poisonous, and even to felonious purposes, may be anticipated from the facility of its administration, and from the communications respecting it which were instantly made to all the daily and weekly papers in the kingdom. All these hypnotic or anæsthetic agents, if breathed for too long a time, without such intermissions in their administration, or without such precautions as a prudent physician will adopt, may be followed by the most dangerous effects, in respect both of the constitution of the blood and of the nervous masses, especially the brain and medulla oblongata. Time and observation have not yet been sufficient to show the results as to chloroform; but a recourse to it should be made with caution, as an effect so potent as it produces cannot be undergone without some risk in certain states and constitutions. At the moment of writing the above, experiments made and published by Mr. T. WAKLEY (*Lancet*, January 1, 1848) demonstrate the poisonous operation of chloroform and the ethers when inhaled by the lower animals, and the following case was published by Dr. GULL.

616. A boy aged eleven, in good health, but his nervous system a little weakened by confinement to bed, his heart and lungs sound, was about to have the flexor tendons of the knee-joint divided in Guy's Hospital, and chloroform inhalation was adopted. "A small quantity of chloroform, not exceeding thirty drops, was put upon a cone of bibulous paper, and placed over his mouth and nose. In less than a minute he was entirely insensible, the pupils becoming widely dilated, and the pulse small and frequent. As the operation was being proceeded with, his consciousness partly returned, and a few drops of the chloroform were put upon a handkerchief and applied to the nose. He was instantly affected, and to such a degree that there was the greatest apprehension of his never rallying. The pulse was very feeble, 56; the breathing so indistinct as hardly to be distinguished; the face pale, lips congested; the symptoms of collapse extreme. Ammonia was employed, and, after about five minutes, he gave two or three deep inspirations: it was, however, more than fifteen minutes before he was out of danger. Subsequently a small quantity of brandy was administered. He complained of headache. For a long time after he recovered his special senses and power of motion, general and perfect anæsthesia of the surface existed. The following day he was quite well." (*Lond. Med. Gaz.*, December 10, 1847, p. 1036.) The above case sufficiently illustrates the injurious action of this substance; and, in the present state of our knowledge and experience of the inhalation of this and other preparations of ether, it is unnecessary to make any farther observation.

617. v. CICUTA VIROSA.—*Water Hemlock*.—This indigenous plant has sometimes produced accidentally the most noxious effects. The roots and the rest of the plant are poisonous, but the roots especially. Among other instances related by WEPFER, eight children ate the roots instead of parsnips. Two of them died. The first symptoms in these two were swelling in the pit of the stomach, vomitings, or efforts to vomit, total insensibility, involuntary discharge of urine, and, lastly, severe spastic convulsions. One died in half an hour, the other

soon after. One who recovered had convulsions, followed by deep coma, from which she could not be roused for twenty-four hours.—*a.* According to GUERSENT (*Dict. des Sciences Méd.*, t. v., p. 205), the first symptoms of poisoning with cicuta are dimness of sight, vertigo, acute headache, pain in the stomach, anxiety, dryness of the throat, thirst, and vomiting; followed by enuresis, epileptic convulsions, lethargy, and insensibility, in some cases; and by delirium, unconsciousness, or convulsions, with tumefaction of the face, protrusion of the eyeballs, &c., in others.

618. *b.* On dissection, METZDORF met only with congestion of the blood-vessels of the brain and its membranes. GUERSENT, in addition to congestion of the cerebral vessels, mentions flaccidity of the parietes of the heart's cavities, and congestion of the lungs and liver with a dark fluid blood. The body is sometimes swollen, the abdomen distended with air in the intestines, and the surface covered with livid spots. But the only changes which are constant are the congestions now mentioned. The same treatment as recommended for *belladonna* (§ 545) or *opium* (§ 657) is required for poisoning with this plant.

619. vi. CONIUM.—*Hemlock*.—*Conium Maculatum*.—*Conia*.—This plant may certainly be viewed as the *κόνειον* of Greek writers—the celebrated *Athenian state poison*, by which SOCRATES and PHOCION died—the *cicuta* of the Romans. NICANDER states that this plant brings on obliteration of the mental faculties, dimness of sight, giddiness, staggering, stifling, coldness of the limbs, and death by asphyxia. "A view of its effects," says Dr. CHRISTISON, "which differs little from the modern notions of the poisonous action of the spotted hemlock." Dr. PEREIRA adds, that the ancients regarded *κόνειον* as having the power of discussing tumours—a virtue which has been assigned to hemlock by writers of the present day. The effects of conium upon animals and upon man are somewhat different, the action on the former more closely resembling that of its alkaloid, *conia*.

620. *A. Symptoms.*—*a.* In small doses it produces but slight or hardly manifest effects. But it sometimes causes, when long continued, disorder of the digestive organs or nervous system, dryness of the throat, thirst, and occasionally the reduction of swellings or of tumours, and an eruption on the skin. If the dose be gradually and much increased, the effects are often more severe; delirium, syncope, or coma supervening. The ancients believed that hemlock exerted a specific influence over the mammae and testicles, preventing the development of the former, and causing wasting of the latter, especially in girls and boys respectively. The Arabians entertained similar ideas. These effects have even been imputed to it in modern times.

621. *b.* In large or poisonous doses the symptoms indicate a dangerous affection of the cerebro-spinal system. In some of the best-recorded cases, coma was the prominent symptom, the effects being similar to those of opium. In other instances, convulsions or violent delirium, or both, were prominent. A soldier had partaken, with others, of a soup containing hemlock leaves, and soon afterward fell asleep. In the course of an hour and a half his comrades

became alarmed on finding themselves affected with giddiness and headache; and the surgeon was sent for. He found the soldier who had fallen asleep in a state of insensibility, from which, however, he could be roused for a few moments. His countenance was bloated, tumid, and bluish; the pulse only thirty, and the extremities cold. The insensibility increased until he died, three hours after taking the soup. Two cases are described by Dr. WATSON, which were fatal in the same short period. Giddiness, coma, and convulsions were the principal symptoms. When the dose is not sufficient to prove fatal, there is occasionally paralysis attended by slight convulsions. Sometimes there is frantic delirium.

622. *B. Conia, conein, cicutine*, or the alkaloid of conium, in which the active properties of the plant chiefly reside, exists in it in combination with an acid—the *conicic*? Its effects are known only by experiments on the lower animals. On them it acts as a powerful paralyzing agent; affecting first the muscles of voluntary motion, then the respiratory muscles of the chest and abdomen, lastly the diaphragm, and thus producing death by asphyxia (CHRISTISON). Convulsive tremours and twitches of the limbs are also sometimes observed. Dr. PEREIRA remarks, that “the primary seat of the action of the *conia* is probably the spinal cord (probably also the medulla oblongata and brain).” “In this *conia* and strychnia agree; but in the nature of the effect, as Dr. CHRISTISON has observed, they are the opposites of each other. *Conia* exhausts the nervous energy of the cord, and causes muscular paralysis; strychnia irritates it, and produces permanent spasm of the respiratory muscles.” These effects of *conia* suggest its employment in convulsive and spasmodic diseases.

623. *C. On dissection*, the chief alterations which are observed are congestion of all the vessels within the cranium, and a very fluid and dark state of the blood. In a case examined by Drs. CHRISTISON and COINDET, the vessels within the head were not particularly turgid, but the blood was everywhere remarkably fluid. Death in this case was produced in an hour, by two ounces of a strong infusion of hemlock leaves with the same quantity of whiskey, which was swallowed in the morning, fasting, at the suggestion of one of those meddling persons who are so very kind in prescribing for their acquaintances that of which they know nothing. The symptoms in this case were coma and slight convulsions. The fluidity and dark hue of the blood are merely the results, as Dr. CHRISTISON suggests, of the asphyxia, which is the proximate cause of death in poisoning by conium. The same treatment as is recommended for *belladonna* (§ 545) or for *opium* (§ 657) is appropriate for the effects of conium.

624. VII. HENBANE—*HYOSCYAMUS NIGER*.—*Hyoscyamia*, &c.—All parts of this plant are poisonous, especially the seeds and roots. They produce somewhat different effects upon animals and upon man, being more hypnotic in the former than in the latter.—*A.* In small doses they are calming, sedative, and slightly narcotic. Mr. HOULTON has shown that their effects vary much with the age of the plant, the season at which the several parts of it are gathered and prepared, and the mode of preparation

and preservation. *Large doses* sometimes procure quietude and sleep, but with no certainty; for they not infrequently occasion dimness of sight with dilatation of the pupil, headache, giddiness, and a state of half-sleeping and half-waking, with a tendency to delirium. In some cases, thirst, nausea, clamminess of the mouth, feverishness, griping and relaxation of the bowels, are induced. *Very large doses* much more frequently produce delirium than sound sleep. In *poisonous* doses it causes loss or disturbance of vision, dilatation of the pupil, coma, with muttering delirium, distortion of the features and loss of speech, paralysis, with irregular convulsive movements, and occasionally violent delirium, and irritation of the stomach and bowels, with vomiting, griping, and purging.

625. *B.* The special effects of *hyoscyamia*, the alkaloid in which much of the active properties of the plant are believed to reside, have not been fully shown. Dr. MORRIS has ascertained that, like other narcotic and sedative vegetables, as opium, hemlock, tobacco, stramonium, digitalis, &c., *hyoscyamus* also yields by destructive distillation an *empyreumatic* oil of great activity; its poisonous properties depending upon a volatile principle which is not essential to the oil, and is productive of coma, convulsions, and speedy death.

626. *C.* *Hyoscyamus*, especially its juice and extract, is most actively poisonous when injected into the blood, less so when applied to the cellular tissue, and still less when taken into the stomach. It is sometimes very active when administered in an enema. It has even produced serious effects when applied to the sound surface in the form of a poultice. WIEBER was called to a lady affected with sopor, dilated pupils, flushed face, loss of speech, full pulse, and swelling of the abdomen, and found that these symptoms were caused by a poultice of henbane leaves applied over the abdomen to relieve strangury. It acts chiefly on the brain, and by absorption into the circulation.

627. *D. Diagnosis*.—The effects of *hyoscyamus* differ from those of *opium* in being more sedative in small doses, by the affection of the sight and dilatation of the pupils, by the much less, and more uncertain, soporific operation in large doses, and by the delirium, loss of speech, and paralysis, with irritation of the bowels, in poisonous quantities. *Hyoscyamus* differs from *belladonna* and *stramonium* by the less frequent and less remarkable occurrence of gastro-intestinal irritation from it, and by the more manifest appearance of narcotic or soporific action. It differs also from *hydrocyanic acid* in producing delirium and paralysis, while the acid occasions insensibility and convulsion, and more rapid results.

628. *E.* The other species of *hyoscyamus*, as the *albus*, *aureus*, *physaloides*, and *scopolia*, are said to be equally poisonous with the *H. niger*. Professor PONÉRÉ states, that the *H. albus* was boiled and distributed by mistake among the crew of a French corvette. But in a short time after eating it they were all seized with giddiness, vomiting, convulsions, colic, purging, and violent delirium. They were all relieved by emetics and purgatives. The appearances in fatal cases have not been described. The treatment is the same as in other cases of narcotic poisoning.

623. *Lactuca virosa*, *L. sativa*, and *Humulus lupulus* are not likely to occasion dangerous effects from accident or otherwise.

630. viii. OPIUM AND ITS PREPARATIONS—MORPHIA AND ITS SALTS.—The operation and effects of opium have been investigated by numerous able inquirers, but most satisfactorily by CHRISTISON, PEREIRA, and CHARVET. Since 1821, when I first resorted to the cold affusion in the treatment of poisoning by opium, I have devoted much attention to the medicinal and poisonous properties of this substance, probably the most valuable of all the articles of the materia medica.

631. A. The local action of opium is exerted chiefly on the nerves of the part, more especially on the sentient nerves, but the irritability of contractile tissues is also affected. When a watery solution, or fluid extract, of opium was applied to a painful part, or to a surface denuded of its cuticle, I found that the morbid sensibility was removed in the one case, and numbness caused in the other; and that the intestinal movements were arrested by the application of the same preparation to the mucous surface of the intestines. This latter result was also remarked by Dr. W. PHILIP. Dr. MUNRO found that opium injected into the cellular tissue caused palsy of the hind legs of a frog. Several physiologists have shown that, when opium is applied to the internal surface of the heart of a frog, this organ ceases to beat.

632. B. The remote effects of opium have been fruitful topics of discussion. It was formerly believed that the impression made by opium upon the nerves of the stomach, or of any other part, is conveyed sympathetically to the brain; but it has been conclusively proved that the poison itself enters the circulation, and acts directly either upon the brain or upon the ganglia and ganglionic nerves supplying the brain and its blood-vessels; this latter alternative appearing to me the most probable. (See § 654, *et seq.*) According to ORFILA's experiments, the action of opium is most energetic when injected into the veins. Opium is more active when applied to a wound than when taken into the stomach; and it often acts, when thrown into the large bowels, with as much energy as when taken by the mouth, and sometimes even more energetically. Much, however, of the effect produced by it, when thus administered, depends upon the state of the large bowels, as respects fecal accumulations, &c., upon the period of its retention, and the mode of its exhibition.

633. a. It has likewise been shown by ORFILA and others, that a large dose of opium affects the lower animals somewhat differently from man, causing in the former accelerated circulation, vertigo, palsy of the hind legs, convulsions, varying from tremours to violent spasms, and a wakeful kind of slumber, attended by convulsions upon the least excitement; while in man simple sopor and coma are most commonly produced, and convulsions much less frequently. According to CHARVET's researches, opium acts as a poison to all animals, when given in a large dose; and on the lower animals it produces congestion of the brain and consequent sopor, irritation of the nervous centres and convulsions, and a directly sedative effect on the muscles.

634. b. The effects of opium in the human sub-

ject are of great importance in a practical as well as in a toxicological point of view. In small doses, opium acts at first as a stimulant of the heart and arteries, causing also a slight exhilarating effect upon the mind, and sense of fulness in the head. A pleasurable state of the whole system is experienced, and a capability of greater exertion. These symptoms are followed, in about two hours, by a diminution of muscular power and of susceptibility to the impression of external objects, and by a desire of repose with tendency to sleep. The mouth and throat generally become dry, thirst is increased, desire of food is impaired, and costiveness produced. These effects are much diminished by frequent repetition, and an increase of the dose is required to produce them in an equal degree.

635. c. In a larger dose, or full medicinal dose, or from two to four grains, the stage of excitement is sooner followed by depression. Dr. CRUMPE (*Inquiry into the Nature and Properties of Opium*, 8vo, 1793, p. 85) took two grains and a half of opium when his pulse was at 70. After a quarter of an hour his pulse rose to 74, and after half an hour to 80. After fifty minutes the pulse had fallen to 64; but in an hour and a half it returned to 70. With the acceleration of the pulse, the skin becomes hot, the mouth and throat dry; thirst is increased, and the appetite diminished. But the symptoms of excitement are soon followed by indisposition to exertion, by sluggishness of the senses, confusion of ideas, and an irresistible desire to sleep, which is generally attended by dreams, sometimes pleasing, at other times frightful. Upon waking, especially if three or four grains have been taken, nausea, or even vomiting, headache, furred tongue, listlessness, and costiveness are complained of; but the accession of these may be prevented by repetitions of the dose, and by even a gradual diminution of it. Dr. BURNES states, that he had made a very fatiguing night march in India with a Cutchee horseman, and assented to his proposal of halting for a few minutes, which he employed in sharing about two drachms of opium between himself and his jaded horse. The effect of the dose was soon evident on both, for the horse finished a journey of forty miles with great apparent facility, and the rider became more active and intelligent.

636. C. The poisonous effects of opium, or the symptoms of poisoning, where opium is given in a single dangerous dose, begin with giddiness and stupor, generally without any previous excitement. The stupor rapidly increases; the person becomes motionless, and insensible to external impression; he breathes slowly, generally lies quite still, with his eyes shut and his pupils contracted, occasionally remarkably contracted; the cornea is dull, or no longer glistening, and the whole expression of the countenance is that of repose. In this stage he may be slightly or momentarily roused by violent excitement, as pinching, &c. As the poisoning advances, the features are ghastly, or slightly livid; the pulse feeble and irregular; respiration shallow, slow, or gentle, and sometimes catching; the muscles exceedingly relaxed; and, lastly, the pulse becomes remarkably slow, unequal, and irregular, and death rapidly ensues, if assistance is not promptly administered.

ed. If recovery takes place, the sopor is succeeded by prolonged sleep, which is followed by headache, giddiness, nausea, and vomiting, loathing of food, distressing languor, and constipation.

637. *D. OPIUM EATING.*—*The excessive use of opium, habitually,* produces a species of slow poisoning, of so long duration as not to be generally viewed as poisoning, although the effects are allowed to be injurious. The habit is usually acquired by persons who have derived advantage from opium in various states of disease, especially painful affections, hysteria, diarrhœa, and numerous other disorders. The habitual opium eater may be instantly recognised by his appearance; by the emaciation of his body; by a withered, yellow, or sallow countenance, and sunken, glossy eyes; and by the bending of the spine and lame gait. His digestive functions are remarkably impaired, his appetite is lost, and he hardly eats. He scarcely has more than one evacuation in the week. As the habit becomes more confirmed, his strength diminishes, and the craving for the stimulus becomes even greater; and to produce the desired effect, the dose must constantly be augmented. The mental and bodily powers are ultimately destroyed, and a universal impotence is the last result.

638. I have met with in practice several instances of opium eating, in which the symptoms were less severe. In these, however, although the quantity taken was excessive, the appetite was not materially, or even at all impaired; and the bowels were often regular, unless when deprived of the usual dose of the opium. The pulse varied from 80 to 100; and the skin was occasionally dry, but more frequently perspirable, or perspired very freely. The effect produced by a desired ordinary dose upon the mental faculties of the opium eater is usually described as that of calmness, comfort, serenity, and happiness; and a capability of supporting mental exertion and bodily fatigue.

639. When deprived of this substance, the opium eater is miserable and distressed; and the whole frame betrays the want of it, by the hollow, dark, and sunken orbits; by the haggard appearance of his features; the general weakness and tremulousness, especially of the hands; by the dry and parched state of the mouth and throat, anxious voice and manner, and by loss of appetite and sleeplessness. Many thus affected are anxious to abandon the practice, and make numerous efforts to accomplish it, but they rarely succeed.

640. If the habit be commenced early in life, the person who is its subject seldom becomes older than forty years; and he may die at an earlier age, if the practice has been excessive. When the quantity of opium taken habitually is comparatively moderate, when it is not increased in quantity or frequency of dose, but little injury to the general health often appears for many years; and even an improvement of the health is often remarked when the practice has originated in the use of opium for painful affections, obstinate diarrhœa, certain states of hysteria, &c. Several persons thus circumstanced have been under my care for various disorders, and they described themselves in better health than before the acquisition of the habit. But in most of these the quantity was

not remarkably large, and was generally not materially augmented. But in others, who take very excessive quantities, either of laudanum or solid opium, and still more remarkably in those who do not confine their indulgence to opium, but have recourse also to other intoxicating beverages to excess, visceral disease slowly and silently supervenes, with its usual consequences; the constitutional powers sink, and death sooner or later takes place. I have thus met with organic diseases of the liver and stomach, of the heart and kidneys, palsy, and tubercular phthisis slowly appear, and ultimately terminate in dropsical effusions, which treatment could not control. I lately attended a gentleman, a graduate of Cambridge, of most Herculean frame, with my friend and former pupil, Mr. PUPER. That gentleman took habitually the largest amount of opium that I have heard of having been taken by one person; but, not content with this, he indulged also in several bottles of wine in the course of the day, and sometimes in strong ale and in spirits. Although scarcely above thirty years of age, his powerful constitution and frame were broken down, his liver was enlarged, and dropsical effusions had supervened.

641. *E. OPIUM SMOKING* is rarely practiced in Europe. But it is not infrequent in numerous countries in the East; and it is the favourite mode of intoxication in China. Dr. PEREIRA has collected most instructive accounts of this practice. MARSDEN states, that the *smokable extract* is made into pills about the size of a pea. One of these being put into the small tube that projects from the side of the opium pipe, that tube is applied to a lamp, and the pill being lighted, is consumed at one whiff or inflation of the lungs, attended by a whistling noise. The smoke is never emitted by the mouth, but by the nostrils, and sometimes, by adepts, through the passage of the ears and eyes. Mr. SMITH, surgeon, of Pulo Penang, states that, although the practice is most destructive to those who live in poverty and distress, or who carry it to excess, yet it does not appear that the Chinese in easy circumstances, and who have the comforts of life about them, are materially affected, in respect of longevity, by the private addiction to this vice. It would appear that, as in *opium eating*, so in *opium smoking*, a moderate addiction to the habit is not attended by remarkable injury to the constitution; and that it is excess in either that is productive of injury.

642. *a. The first effect on opium smokers is to render them more animated and loquacious.* "Gradually the conversation drops; laughter is occasionally produced by the most trifling causes, and to these succeed vacancy of countenance, pallor, shrinking of the features, so that the smokers resemble persons convalescing from fever, followed by a deep sleep for half an hour to three or four hours. An inordinate quantity causes headache, vertigo, and nausea. The Malays are rendered outrageous and quarrelsome by the opium-pipe." It is extremely difficult to discontinue this vice; yet there are many instances of its being done. This destructive practice deteriorates the physical constitution and moral character, especially of the lower orders. Its effects on the system are manifested by stupor, forgetfulness,

impairment of the mental powers, emaciation, debility, sallow complexion, lividity of the lips and eyelids, languor and lack-lustre of the eyes, loss of appetite, sweetmeats or sugar-cane being most relished.

643 In the morning the opium smoker has a most wretched appearance, and is unrefreshed by sleep, however profound. He experiences a remarkable dryness and heat in the throat, with depression and restlessness, which incite him to have recourse to the opium pipe; and if it be not resorted to, there is great prostration, torpor, vertigo, discharge of water from the eyes, &c. If the privation be complete, coldness of the body, aching pains in various parts, feelings of bodily and mental misery, and sometimes diarrhœa, are complained of. Total privation has even been followed by death, if the habit has been long continued and excessive. A close resemblance may here be traced between the effects of *opium smoking* and *tobacco smoking* (§ 527). The latter is as injurious as the former, when as excessively practiced; and the one habit, as well as the other, occasions more or less general and sexual impotence, and entails on the offspring a weak, decrepit, and stunted growth, and a delicate and strumous constitution. How weak and debased must be the mind that, by the selfish and excessive indulgence of a petty vice, sacrifices not only his own health, but also the health and constitution of his offspring, and the ability of perpetuating his name and lineage!

644. *F. Diagnosis of Poisoning by Opium.*—The effects of this drug may be mistaken for *apoplexy* or *syncope*, or for the *stupor* consequent upon an attack of *epilepsy*, or upon *suppression of urine*. But the sopor of opium is different from the coma of these, inasmuch as the individual is capable of being momentarily roused from the former, unless death be very near, by means of pinching, tickling, brisk shaking, or loud talking. The state of restored consciousness is, however, frequently imperfect, and is speedily followed by lethargy. When convulsions attend poisoning by opium, the difficulty of distinguishing it from *epilepsy* is greater; but even then the patient may be momentarily roused, which is impossible in the epileptic paroxysm. In all the maladies, moreover, just enumerated, the pupils, in the majority of instances, are dilated or natural; and partial paralysis, or even more complete palsy, attends many cases of them; whereas in opium poisoning the pupils are remarkably contracted. Sopor from *intoxication* may be confounded with opium poisoning, but the redness of the conjunctiva, the ferrety eyes, the full and rapid pulse, and the odour of alcohol in the breath, will generally indicate the nature of the case. Poisoning by opium is not infrequent in *infants and children*; and it is in them very generally attended by convulsions. It is with great difficulty distinguished from *infantile convulsions*, proceeding from cerebral or other affections. Contraction of the pupil is almost the only indication of this poison having been given; the history of the case, and other circumstances which his acumen will suggest, will in some measure guide the physician. The diagnosis of poisoning by other narcotics than *opium* is noticed where they are treated of.

645. *G. The quantity of opium which may be*

fatal will necessarily depend upon the state of the stomach and of the nervous system at the time of taking it.—*a.* During painful or spasmodic disorders, and in states of mental excitement or irritation, very large doses of opium may be taken with comparatively little effect. A lady, in a state of great excitement and irritation, took an ounce of laudanum when going to bed, with a suicidal intention; but she was surprised, on waking in the morning, at finding herself alive, with rending headache, nausea, and feeling of general disorder, from which she soon recovered, no aid having been administered. I have repeatedly prescribed, and once taken, as much as four grains; but I would not advise a larger dose to be given; and even this dose may be followed by unpleasant effects in some constitutions, especially the susceptible and delicate, and when the system is depressed or where there is a tendency to apoplexy; and even a smaller dose may be serious when administered in an enema or in a suppository. Mr. TAYLOR states that a man was killed by ten grains of solid opium; and a woman of middle age by eight grains, given in two doses. Dr. CHRISTISON says that the *smallest dose of solid opium* which has been known to have proved fatal to an adult was four grains and a half, mixed with nine grains of camphor, death having taken place in nine hours. In a case recorded by Dr. SKAE, it is doubtful whether death was caused by two or by four drachms of the tincture. A lady suffered very serious symptoms from twenty drops of the tincture administered in an enema; and Dr. STEINTHAL states that one grain of opium, in a clyster, occasioned alarming effects. Idiosyncrasy may be the cause of the danger produced by small quantities of the drug. On the other hand, recovery has taken place from very large doses, when vomiting has soon occurred or been procured by treatment, or when they have been taken on a full stomach, or in states of nervous excitement. In such circumstances even as much as four ounces of the tincture has failed to produce death, as in a case mentioned by Mr. TAYLOR. [We have attended, in consultation, a lady who died from swallowing four grains of opium in pill; and in another case, a gentleman, who recovered after taking eighteen grains of sulphate of morphia, although it had not been evacuated from the stomach. In this case the treatment was bleeding, cold to head, external revulsives, constant rousing and shaking, stimulating enema, and internal stimulants, &c.]

646. *b. Infants and children* are remarkably susceptible of the influence of opium, and instances of poisoning among them by over-doses of the preparations containing opium are very frequently met with. An instance is reported (*Lancet*, Feb., 1842) of an infant, two days old, having been killed by one minim and a half of the tincture; and that of another by two drops. A child four months old was nearly dead in consequence of having taken one tenth of a grain of opium. Less than half a grain was given to a child four years and a half old: it soon became comatose, and died in seven hours. Dr. MERRIMAN met with an instance of excessive stupor produced in an infant a month old by a single drop of laudanum; and he met with two instances of death caused by a small dose of GODFREY'S Cordial, which contains opium. Even

twelve or fifteen drops of paregoric elixir may prove fatal in an infant. In most fatal instances in children of poisoning by opium, the post-mortem examination affords little or no information; congestion of the brain and of the lungs, with fluidity of the blood, have been the chief appearances which I have remarked.

647. *H. The periods which elapse from the administration of the poison until the commencement of its effects are various.* A large quantity in the form of a tincture, taken on an empty stomach, begins to act in a few minutes. Coma seldom comes on before half an hour has elapsed. The interval is sometimes considerable, even when the tincture has been taken. Dr. CHRISTISON refers to a case where it was considerably more than an hour after two ounces and a half of the tincture and a drachm of the extract had been taken. Opium in the solid form generally requires a longer time to act than the tincture. DESRUELLES, however, records a case where two drachms of solid opium produced sopor in fifteen minutes; and in a case published in America, the largest quantity of it ever known to have been taken at once did not occasion this effect until an hour had elapsed. The interval may doubtless be prolonged if the opium be taken by a person already excited by spirituous liquors, or intoxicated. Mr. SHEARMAN relates the case of a man who, in a state of intoxication, took two ounces of laudanum, and had no material stupor for five hours; but he ultimately died.

648. *I. The period at which death takes place varies from two hours, the shortest period, to forty-eight hours, the longest period; but most fatal cases terminate between six and twelve hours after the ingestion of the poison.* Those who live above twelve hours generally recover, if they be judiciously treated. Instances, however, have occurred where an apparently efficacious treatment has been too soon suspended or relinquished, owing to appearances of rapid recovery, and a relapse has supervened and carried off the patient. In eight fatal cases of poisoning by opium, reported by Dr. BECK, the smallest quantity taken was one drachm, the largest one ounce and a half. The shortest time between the taking of the poison and death was eight hours, the longest twenty hours.

649. *K. Several preparations containing opium have produced fatal effects, especially when administered by ignorant or careless persons to infants or children.*—(a) *Paregoric elixir*, the compound tincture of camphor, which contains somewhat less than one grain of opium in half an ounce, has caused death. A child between five and six years of age was killed by a dose which contained about one grain of opium; and another aged seven months by a dose equal to a quarter of a grain of opium. See *Pharm. Journ.*, April, 1845, p. 464.—(b) *DOVER'S Powder*.—*Pulvis ipecacuanha compositus* has also been fatal to children. In one case, four grains of this powder, equal to two fifths of a grain of opium, caused death; and in another, ten grains caused the death of an infant in twenty-four hours.—(c) *Syrup of poppies* is said to contain one grain of the extract of English opium to one ounce. The common dose of it to an infant of six or seven months is half a drachm. But this should be the largest dose allowed. Owing, however, to this dose, or its equivalent

for other ages, being much exceeded, and owing to a mixture of tincture or infusion of Turkey opium, the strength of which is often variable, being substituted for the true sirup of poppies, poisoning has often occurred from this medicine. Seven children died from this cause in 1837. In a case alluded to by Mr. TAYLOR, half a teaspoonful of this sirup caused the death of an infant six months old. The narcotic symptoms were developed in three quarters of an hour. The sirup in this case was probably prepared with tincture of opium in excessive quantity.—(d) *Decoction of poppies* has not infrequently been fatal to infants. A teaspoonful of it has been fatal to a healthy child. A woman boiled two poppy heads in a quarter of a pint of milk, and gave two small spoonfuls of this decoction to her infant. In an hour the child fell into a deep lethargic sleep, the breathing became stertorous, and in ten hours it died. A maid-servant gave an infant two teaspoonfuls of a decoction of one poppy head in a small pot of water. The child was found dead in the morning. The brain and its membranes were much congested, and the ventricles contained bloody serum.—(e) Several nostrums, especially the "*black drop*," and BATTLE'S "*sedative solution*," which are much stronger than the official tincture, have produced fatal effects. Mr. STREETER states that a drachm and a half of the latter was fatal to a lunatic, and 20 minims killed an old woman. "*GODFREY'S Cordial*" and DALBY'S "*Carminative*," which contain a small quantity of opium, have caused, in some instances, the death of infants to whom they had been given in large doses.

650. *L. Morphia and its Salts.*—Poisoning with the salts of morphia has occurred in several instances. The *acetate* and the *muriate* of morphia have been the salts usually employed. The symptoms differ but little from those produced by opium, but spasms or convulsions are more frequently observed after morphia than after opium. The acetate of morphia has been estimated at four times the strength of pure Turkey opium; but I believe that pure morphia, and especially either of the salts just named, is five times the strength of opium. It is difficult to determine the quantity which may be injurious. I have seen one third of a grain given for the first dose produce unpleasant or even distressing effects. It singularly happened, that the lady, whose case was alluded to above (§ 645) as having taken with a suicidal intention, during extreme mental excitement, a large quantity of laudanum, and recovered from it without any assistance, and without any suspicion of the act, had prescribed for her by me, many years afterward, one quarter of a grain of the acetate of morphia, and although she had then recovered from so large a quantity of opium, this dose of the morphia produced very distressing effects, with a sense of sinking and symptoms of vital depression, requiring powerful stimulants to remove. Dr. KELSO (*Lancet*, September, 1839) suffered dangerous symptoms from having taken about half a grain of the muriate; and Mr. TAYLOR was informed that an adult was killed by three grains taken medicinally; and he adds, that there is reason to suppose that half a grain of the acetate caused the death of a lady to whom it had been given medicinally when in a state of ill

health. Dr. CHRISTISON mentions a fatal case from the ingestion of ten grains, death taking place in twelve hours, although the stomach had been completely cleared of the poison within half an hour from the time when it was taken. One fifteenth part of a grain applied *cutaneously*, produced severe cerebral symptoms in a case alluded to by Mr. TAYLOR.

651. The effects of either of the salts of morphia will depend much upon the state of the person at the time who takes it. A large dose, from half a grain to a grain, may be of service, or at least not injurious, even when given for the first time, in states of nervous or vascular excitement, during excessive pain, and in several spasmodic diseases; but either of these quantities may be dangerous, or even fatal, if it be given to a person morally and physically depressed, or to one possessing weak vital resistance, or in a state of marked debility and ill health. These salts should never be given to children under ten or twelve years of age. I speak generally, some exceptions being admitted among children not much below this age. The observations offered above, as to the operation of opium when administered by the rectum (§ 632), equally apply to the salts of morphia.

652. I am acquainted with seven ladies who have either lately been, or are still occasionally, under my care, and who *habitually take excessive quantities of the acetate of morphia*. The acetate is the salt which they all employ; and they all take it in solution, with the addition of acetic acid, and, in some instances, of an aromatic spirit or tincture. The quantities taken at one dose in these cases vary from two to six or seven grains, which are generally taken thrice daily. In three of these cases, the quantity has not been materially increased for eight or nine years; but during that time sundry efforts have been made gradually to diminish the quantity, but they have never been steadily persevered in, a gradual increase, and return to the larger quantity, having soon followed. The effects have not appeared in these cases materially different from those of laudanum.

653. *M. Appearance after Death by Opium or its Preparations*.—In a case of poisoning by opium in a child four years old, death having taken place in eleven hours, I found the following appearances. There was considerable lividity of the back and more depending parts of the body. The vessels and sinuses of the brain were much congested, with a dark fluid blood; and more serum than usual was found at the base of the skull, and in the ventricles. The vessels of the medulla oblongata and spinal cord, and the vertebral sinuses were remarkably engorged. The lungs were congested with fluid blood. The right cavities of the heart also contained blood. There was slight redness of the villous coat of the stomach and duodenum. In a case referred to by Dr. CHRISTISON nearly similar changes were observed in the brain and lungs; but, although the body had been kept only two days in the month of February, the belly emitted a putrid odour when opened. Congestion within the cranium, with more or less serous effusion, and congestion of the lungs, the blood being dark and fluid, have generally been observed. Dr. BRIGHT and Mr. TAYLOR met with a spot of ecchymosis on the surface of the brain in addition to unusual tur-

gescence of the vessels. Dr. CHRISTISON remarks that congestion and serous effusion are by no means universal, for in a case which proved fatal in seven hours, and which he examined, neither of these changes was very apparent. Extravasation of blood within the cranium is a rare effect of opium. In the case of a female, who died eight hours after taking two ounces of laudanum, Dr. JEWEL found several clots of blood in the substance of the brain, and one, which lay in the anterior right lobe, was an inch long. (*Lond. Med. and Phys. Journal*, February, 1816.) Redness of the stomach is by no means general, and no inflammatory changes are observed. Lividity of the external surface of depending parts is commonly observed, and is owing to the fluid and dark state of the blood. But the blood is not always fluid, at least in all parts of the body. It is chiefly, however, in the cavities of the heart where it has been most frequently found coagulated. In four cases referred to by Dr. CHRISTISON there were clots found in both ventricles. This physician has particularly noticed the rapid passage of the body into putrefaction, both in cases which have come under his own observation, and in those recorded by others. Of a body, which had been kept only thirty hours in a cool place in December, the cuticle easily peeled off, and the joints were flaccid, an acid smell being exhaled. In other cases, the early progress of putrefaction has been observed, but not constantly or even generally. The poison may sometimes be found in the stomach, or its smell may be detected; but as frequently neither can be detected, especially when a considerable time has elapsed before death has taken place, owing to the absorption or partial digestion of it, or to its discharge by vomiting or the stomach-pump. In the latter case, the opium may be detected in the matters evacuated from the stomach.

654. *N. Modus Operandi of Opium*.—That the active and odorous principles of opium are absorbed is proved, 1st, by the opiate odour being often perceived in the breath of persons who take opium, and, according to BARBIER, in the perspiration and urine; 2d, by the narcotic influence of the milk on infants when the nurses have taken opium: this I have observed on several occasions; and, 3d, by the assertion of BARRELL, that he has detected morphia in the blood and urine, after the ingestion of large doses of opium; but this requires farther proof. That the effects of opium upon the frame are due chiefly to the absorption of it, is shown by the following circumstances: The effects produced by the injection of opium into the veins are the same in kind, but more intense in degree, as those which follow the administration of it by the mouth; and the constitutional effects produced by the drug are proportionate to the absorbing powers of the surface to which the drug is applied. The effects of opium are, 1st, *primary and local*; 2d, *secondary and remote*.

655. *a. The direct or local action* is on the nerves, as already shown (§ 631). It most probably excites or stimulates the nerves primarily; but this influence is only temporary and of short duration, and is followed by anæsthesia and paralysis—by a privation of energy or power. The *remote* operation is exerted chiefly on the brain, medulla oblongata, and spinal

cord; or, rather, upon that portion of the ganglial system and nerves supplying the nervous centres, and the blood-vessels of these centres and their membranes, through the medium of the blood, either principally or altogether; or partly, also, by the propagation of the direct or local impression or influence produced by the drug. That the remote effects are produced upon, or by means of, that portion of the ganglial system supplying the large nervous centres, and consecutively upon the brain, rather than upon the brain more immediately and independently of this part of the ganglial system, is indicated by the fact of the structure of the brain being itself as insensible of, and, as far as our senses enable us to judge, as little influenced by irritants applied to it, as is the structure of any other secreting organ—of the liver, kidneys, &c., as well as by various other considerations and analogies, and more especially by what is known or presumed of the functions of the ganglial system.

656. *b.* As to the nature of the effect thus produced upon the nervous system, upon the ganglial and the cerebro-spinal, it may be inferred, with tolerable truth, to be primarily *exciting* when the dose is small or moderate, and consecutively *hypnotic*, *narcotic*, and *alterative*; but that, when the drug is taken in excessive quantity, the exciting operation is not recognised, while the consecutive effects are most prominent and intense; the alterative effect, however, being evinced chiefly in cases of chronic poisoning by opium, by opium eaters and opium smokers, and where opium in any form or dose is taken frequently for a long period. The *proximate cause of death* by opium may be referred partly to the extreme congestion of the brain and medulla oblongata caused by it, and partly to the gradual extinction of the influence exerted by the ganglial system upon the cerebro-spinal centre. Most probably the depression or exhaustion of this influence causes the congestion, which, in its turn, aggravates and ultimately extinguishes the influence of this part of the ganglial system; or, the presence of the poison in the blood of the cerebral vessels may so congest them, by depressing the energy of the ganglial nerves supplying them, as to paralyze the brain, and gradually arrest all the functions more immediately depending upon the cerebro-spinal system. According to either of these views, which differ but little from each other, the paralysis of sensation and motion—the extinction of consciousness and volition—is soon followed by paralysis of the respiratory movements; and asphyxia, with its usual results—congestion of the lungs, and a dark and fluid state of the blood—is the manner in which death takes place.

657. *O. Treatment of Poisoning by Opium, or its Preparations.*—The obvious intentions are, 1st, to remove the poison as promptly as possible; and, 2d, to counteract and remove the effects which have been produced, and prevent the accession of others.—*a.* The stomach-pump should be resorted to as speedily as possible, and the stomach completely emptied and washed out by means of it. When the stomach has power to act, emetics may be employed. The best emetics are the sulphate of zinc, mustard mixed in water, or a strong solution of salt; but, in order to excite the paralyzed stomach

more completely, camphor and capsicum may be given with the sulphate of zinc, this last being administered in a dose of half a drachm or two scruples, which may be repeated in a short time if the first dose fails to act. When the stomach-pump is not at hand, a long tube, or a catheter with a bladder attached to it, as advised by Mr. BRYCE, may be substituted. After the stomach has been filled with warm water from the bladder, the tube is to be turned down so as to act upon the contents of the stomach as a siphon. When emetics are inoperative, and the stomach-pump or its substitute cannot be obtained, then it has been recommended to inject tartar emetic in the veins; but more than a grain should not be ventured on, and care must be taken not to allow the introduction of air. This, however, is a hazardous practice and seldom required, when the means already, and those about to be advised, are duly employed.

658. *(b)* The removal of the lethargy already produced by opium is best accomplished by affusion of cold water on the head and neck, as first recommended, and its effects illustrated, by Mr. WRAY and the author. (See *Lond. Med. Rep.*, xviii., 26.) Children may be placed in a warm bath, to which mustard is added, and the cold affusion on the head momentarily adopted. In all cases, the cold affusion should not be continued too long at a time, but employed at intervals, or with the return of the lethargy. It will often be found that, when emetics have been given without effect, owing to the paralyzed state of the stomach produced by the narcotic, the cold affusion will have the effect of rendering them sufficiently operative, especially if the fauces are tickled with a feather at the same time, or soon after the affusion has been employed. Other means of rousing the patient should not be overlooked, and may be resorted to in the intervals between the affusion. Flagellation on the palms of the hands, on the feet, or back; making the patient to walk between two assistants; stinging with nettles, pinching, &c., have severally been found of more or less service. Various internal excitants may be exhibited, as asafetida, ammonia, musk, capsicum, camphor, and may even be administered in enemata; and various exciting odours or vapours, as those of ammonia, aromatic vinegar, may be held at intervals near the nostrils. If these means fail, electricity, galvanism, or electro-galvanism may be adopted. [We have found galvanic magnetism the most important agent in the treatment of narcotic poisoning.] As death is evidently proximately caused by asphyxia (§ 656), artificial respiration should be resorted to in extreme cases, especially if the case is too far advanced to be benefited by cold affusion, or when this latter fails, which, however, will rarely occur, if judiciously employed. Frictions over the chest, with stimulating embrocations, with camphor, ammonia, capsicum, &c., will be found to aid the influence of artificial inflation of the lungs. Instances have been published by Dr. WARE, of Boston, United States, and Mr. WHATELEY, of the good effects of artificial respiration in almost hopeless cases of poisoning by this drug.

659. *c.* The subject of *antidotes against the effects of opium* has been examined by ORFILA, and he has found all those which have been

proposed at various times quite unsuccessful as long as the poison still remains in the stomach, the only exception being the decoction of galls. When the poison has been as completely removed as possible, camphor, green tea, and strong coffee have been found of service in keeping the patient awake, or in reviving him, and are suitable aids to the cold affusion, or even to the tepid affusion, when the coma is not profound.

660. *d.* As to the propriety of prescribing *local* or *general blood-letting* in cases of poisoning by opium and other narcotics, it may be remarked that cases will occasionally present themselves in which, at some period of their progress, either the one or the other may be practiced with advantage. When the patient is plethoric, young, and strong; when there is stertorous breathing, with other symptoms of congestive apoplexy; and when the countenance is bloated, the eyes injected or suffused, then general or local blood-letting, especially the latter, and preferably by cupping on the nape or on the mastoid processes, to a considerable amount, will generally be most beneficial. But before vascular depletions are prescribed, the evacuation of the poison should be attempted or procured. In a case detailed by Dr. Young (*London Med. Gaz.*, vol. xiv., p. 655), of the United States, about thirty ounces of blood were taken from the arm at three bleedings; cold was applied to the head and sinapisms to the legs, and the patient recovered, although an ounce of laudanum, in a teacupful of whiskey, had been taken and remained upon the stomach. In cases which admit of doubt as to the propriety of blood-letting, advantage will be derived from *dry cupping* on the nape. I have prescribed it in one case of poisoning by opium with success. During the coma produced by this drug, or by other narcotics, the loss of a small quantity of blood often produces serious depression. Therefore depletions of every kind should be cautiously employed, and not be attempted unless the breathing is stertorous, puffing, slow, and regular, and the pulse still possesses some degree of power. The effect of either bleeding or dry cupping will be greatly aided, and the necessity of having recourse to either frequently superseded by a due recourse to the *cold affusion*, which generally prevents the distressing headaches, and other cerebral and nervous symptoms, usually experienced for some days after recovery, when it has not been employed.

661. IX. SULPHURETED HYDROGEN GAS. — NYSTEN found that a few cubic inches of this gas caused almost immediate death with convulsions when injected into the veins, although at once absorbed by the blood; and that the same quantity was almost as rapidly fatal when injected into the cavity of the chest. Similar results were obtained when it was injected into the cellular tissue, or even when left for some time in contact with the sound skin. According to THENARD and DUPUYTREN, air impregnated with the 1500th part of this gas kills birds in a short time, and with the 800th part soon kills a dog. CHAUSSIER found that in a moderate quantity it was quickly fatal, whether it was inhaled or injected into the cellular tissue, stomach, or rectum, or simply applied to the skin. Nine quarts of the gas thrown into the

rectum of a horse killed it in one minute; and a rabbit whose skin was exposed to it died in ten minutes. (CHRISTISON and SEDILLOT'S *Journ.*, xv., 28.) Dr. CHRISTISON and Dr. TURNER found that it appeared to cause in plants a state analogous to narcotic poisoning in animals.

662. *A.* The *symptoms*, in cases where the vapours, consisting of an admixture of those of ammonia with this gas, such as they exist in the pits of the Parisian necessaries, as described by HALLÉ and others, are those of extreme vital depression and of asphyxia, and often terminate fatally in a very short time. If the person be but slightly affected, he complains of nausea and sickness; his skin is cold, his respiration is regular, the pulse is frequent, and the muscles, especially those of the chest, are affected with spasmodic twitchings. If he be more severely affected, he becomes soon deprived of sense and motion; the surface is cold, the lips and face assume a violet tint, the lips are covered with a sanguineous mucus; the respiration is hurried, laborious, and convulsive; the pulse is small, weak, irregular, and hurried; and the muscles and limbs are relaxed. If still more intensely attacked, death either takes place immediately, or, in addition to these symptoms, there are violent twitchings of the muscles or violent spasms. When the person is sensible after exposure to these vapours, he often complains of severe pains, and the pulse is very frequent and irregular. If the symptoms are very severe, recovery rarely takes place.

663. Instances of poisoning by sulphureted hydrogen unmixed with other vapours or gases, are not of frequent occurrence. Mr. TAYLOR states that the men excavating the Thames tunnel suffered severely from the presence of sulphureted hydrogen, which he found both in the air and in the water. The gas issued in sudden bursts, so as to be at times perceptible by the odour. By respiring this atmosphere, the strongest men were in the course of a few months reduced to a state of extreme exhaustion, and several died. The *symptoms* with which they were first affected were giddiness, sickness, and general debility. They became emaciated, and fell into a state of low fever, accompanied with delirium. (*Op. cit.*, p. 623.)

664. In the more *acute states* of poisoning with this gas, the symptoms vary with the concentration of the poison. When breathed in a moderately diluted state, a sense of weight or oppression is felt at the epigastrium and in the temples, with giddiness, nausea, sudden weakness, and sinking, soon followed by a loss of sensation and motion. If removal to a pure air be effected immediately upon the occurrence of these symptoms, and if stimulants, the cold affusion, a moderate depletion, and other suitable means be employed, life may be restored. If, however, the patient remain but a short time unassisted, and especially if the gas be breathed after insensibility has taken place, recovery is almost hopeless. When the air contains less of this gas, and the respiration of it continues for some time, vital depression, pains through the frame, convulsions or spasms, delirium, coldness of the surface, laborious respiration, a weak and irregular pulse, followed by coma and tetanic spasms or convulsions, are the prominent symptoms. "When the air is only slightly

contaminated with this gas, it may be breathed for a long time without producing any serious symptoms." Sometimes there is nausea or sickness, with pains in the head or in the abdomen: these are often complained of by persons engaged in chemical manipulations with this gas. Sulphureted hydrogen is readily absorbed into the blood, to which it gives a brownish-black colour.

665. The admixture of this gas with other gases and vapours render them remarkably deleterious. Probably a small portion of it exists in the noxious emanations disengaged from cess-pools, privies, drains, &c. The presence of it in all such emanations is well shown by exposing to them a piece of filtering paper moistened with a solution of lead. Dr. CHRISTISON remarks, that the smell alone should not be relied upon, as putrescent animal matter exhales an odour like that of sulphureted hydrogen, though none be present. This gas may be so abundant as to prove quickly fatal where lights burn with unimpaired brilliancy; and in places where it is apt to accumulate, the contamination by it may vary so much as to render the air either unrespirable in a few minutes after it has been respired without risk, or respirable soon after fatal effects by it.

666. *B. The Appearances after Death.*—A highly offensive odour is exhaled from all the cavities of the body, and, if inhaled into the lungs of the persons making the inspection, unpleasant symptoms, chiefly syncope, or even asphyxia, are occasioned by it. The mucous membrane of the nose and fauces is covered by a brownish viscid mucus. The muscles are of a dark colour, have lost their contractility, and are insusceptible of the galvanic stimulus. The lungs, brain, and liver are congested with black fluid blood. The right cavities of the heart are also congested with fluid black blood. The body rapidly undergoes putrefaction. When polished silver, or white-lead, is introduced into the cavities or under the skin, it soon becomes blackened. The treatment of poisoning by sulphureted hydrogen, or by admixtures of it with other gases or vapours, is the same as that recommended for the effects of carbonic acid gas and its admixtures. (See § 609, *et seq.*)

667. CLASS VIII. NARCOTIC AND IRRITANT POISONS—NARCOTICO-ACRID POISONS—ACRO-NARCOTICS.—The designations of this class of poisons indicate their operation. Certain of these substances are injurious in consequence of their irritating rather than of their narcotic action; while others produce a more prominent narcotic than irritant effect. Some, and probably most of them, conjoin with these modes of action more or less of a vitally depressing or exhausting operation. Owing to the effects of these poisons being thus complex, and more especially to either of their effects being more prominent than the others, these poisons have been variously classed, but chiefly as narcotics, or as irritants, or as acro-narcotics; and in this last category I now consider them. I shall, however, notice only those which are most likely to prove poisonous owing to their possession of these properties in a marked degree.

668. i. EMPYREUMATIC OILS.—The empyreumatic oil of tobacco, and of various other poisonous plants, are active poisons. Several other empyreumatic oils are used in medicine which

act powerfully as stimulants and antispasmodics, and which are more or less injurious when administered in excessive doses. The chief of these are, oil of amber, oil of wax, beech-oil, DIPPEL's animal oil, the oil procured by the destructive distillation of lard, &c. Dr. CHRISTISON states that this last oil, when freed of adhering acid by rectification from quick-lime, is limpid and very volatile, has an insupportable smell, and diffused in the air it irritates the eyes and nostrils, and occasions giddiness. BUCHNER found it to possess narcotic properties when its vapour was inhaled; but it is less powerful when taken into the stomach, although it then causes symptoms of irritation and insensibility. An instance of poisoning by the oil of DIPPEL, or the rectified empyreumatic oil of hartshorn, is mentioned by CHAUSSIER, who states that the person took a spoonful by mistake, and died almost immediately. No morbid appearances could be detected in the dead body.

669. ii. FOOL'S PARSLEY.—*Aethusa cynapium*—has occasioned serious accidents owing to its resemblance to parsley. Professor FICINUS discovered in it an alkaloid soluble in water and alcohol, but not in ether. Mr. STEVENSON (*Lond. Med. and Phys. Journ.*, xiv., 425) has recorded the cases of two ladies who ate of this parsley in a salad, and were soon afterward seized with nausea, vomiting, headache, giddiness, somnolency, pungent heat in the mouth, throat, and stomach, difficulty in swallowing, numbness in the limbs, tremours, and frequent startings. Dr. CHRISTISON mentions the case of a child, recorded by GMELIN, that died in eight hours after having eaten the *athusa*. The symptoms were spasmodic pain in the stomach, swelling of the belly, lividity of the surface, and difficult breathing. In two children who recovered, complete insensibility, dilated insensible pupils, staring of the eyes, and in one vomiting, in the other convulsions, were the prominent symptoms. The treatment consisted in the administration of milk, sinapisms to the legs, and cold sponging with vinegar.

670. iii. FUNGI, POISONOUS.—Poisonous Mushrooms.—Poisonous mushrooms and the effects produced by them have been fully discussed by FODÉRÉ, ORFILA, DE CANDOLLE, ROQUES, GREVILLE, CHRISTISON, and others, to whose works I must refer for many interesting details, and for the characters which distinguish the several poisonous species from the edible.—A. The poisonous species enumerated by ORFILA are the *Amanita muscaria, alba, citrina, and viridis*; the *Hypophyllum maculatum, albocitrinum, tricuspidatum, sanguineum, cruz-melitense, pudibundum, and pellitum*; the *Agaricus necator, acris, piperatus, pyrogalus, stypticus, annularis, and urens*; and to these may be added *Agaricus semiglobatus and campanulatus*. It is probable that other species are also injurious, or may become injurious owing to season and other causes about to be noticed.

671. Numerous circumstances influence the properties not only of those which are ascertained to be injurious, but also of those which are esculent. Climate, season, soil, and manure, age, or period of the year when they are gathered, cooking and drying, severally change the properties of both the poisonous and esculent species; and in certain constitutions and idiosyncrasies even the latter class disagree,

and are more or less injurious, causing diarrhœa, nausea or vomiting, colic, somnolency, &c. It is even believed that the best mushrooms, when taken in too large a quantity, or too frequently, or for too long a time, are deleterious. The writers mentioned above (§ 670) have given general directions for distinguishing the wholesome from the poisonous species; but these cannot be relied on, for the former may become injurious owing to the circumstances just stated, and to others not fully recognised or explained, if their appearances be not duly observed. Much of the unpleasant effects produced by them has been owing to the carelessness of the collectors who have gathered some of the poisonous species, as well as of the esculent species, when they have become old or sickly, and mixed them with those which are wholesome. This is not infrequently the case when mushrooms are gathered from the fields for the manufacture of catsup. The surest tests of deleterious fungi are, an astringent, styptic, hot, or pungent taste, and a disagreeable pungent odour, an orange or rose-red colour, or a blue tint soon after being cut; and the circumstances of their growing in tufts or clusters from the stumps or trunks of trees. The poisonous properties of fungi have been supposed to reside in a certain principle which has been called *fungin*, but its nature and physical properties are imperfectly known.

672. *B.* The symptoms produced by poisonous fungi vary from those of extreme irritation of the gastro-intestinal mucous surface to those of fully-developed narcotism; but generally they are an association of both classes, either predominating in different cases. A man ate by mistake several of the *Agaricus campanulatus*, but, before ending his repast, and not above ten minutes after he began it, he was attacked with dimness of vision, debility, giddiness, trembling, and loss of recollection. On obtaining assistance his countenance expressed anxiety; he reeled about, and could hardly articulate; his pulse was slow and feeble. He soon became so drowsy that he could hardly be kept awake. Vomiting was produced by sulphate of zinc, and he gradually recovered. (*Lond. Med. and Phys. Journ.*, xxxvi., 451.)

673. Several soldiers ate a quantity of the *Amanita muscaria*. In the evening, some hours afterward, they began to complain of anxiety, a sense of suffocation, frequent fainting, burning thirst, and severe gripes. The pulse became small and irregular, the body bedewed by a cold sweat, the features changed, and the nose and lips of a violet tint. To these supervened tremblings, tumefaction of the abdomen, and a profuse fetid diarrhœa. The extremities became cold and livid, the pain of the abdomen intense, delirium and coma took place, and death followed. In the former case, the symptoms were those of narcotic poisoning; in the latter, those of irritation and vital depression. In other instances the symptoms are those of gastro-intestinal irritation, conjoined with narcotism, or with narcotism and extreme vital depression.

674. Six persons ate carp stewed by mistake with the *Amanita citrina*. Three of these had vomiting, followed by deep sopor, but recovered. One had violent cholera, but recovered also. Two (children) became profoundly le-

thargic and comatose; emetics had no effect, and death soon ensued. Six persons ate a quantity of the *Hypophyllum sanguineum*, and from twelve to thirty hours after the poisonous meal they experienced pain in the stomach, a sense of impending suffocation, and violent efforts to vomit. To these were added sopor, and several hours afterward tetanic spasms and convulsions; other severe symptoms, varying in character with the quantity which had been taken, also supervening in the progress of the cases. In one, profound lethargy and general coldness of the surface; in another, vomiting, bloody stools, and yellowness of the skin; in a third, delirium, tremblings, coma, and convulsions; in a fourth, loss of speech and severe dysentery; and in a fifth, colic and inflammation of the bowels, without diarrhœa. Those who recovered remained long in a state of delicate health.

675. Dr. CHRISTISON ascribes the tardiness of the approach of the symptoms in some cases to the indigestibility of most of the fungi, which in some instances is so great, that portions of them have been discharged by vomiting as late as fifty-two hours after they were swallowed. But this slowness of operation is not generally observed, for the effects sometimes appear in a few minutes. The most immediate effect produced by poisonous fungi is paralysis of the vital actions of the stomach, the symptoms afterward appearing with a rapidity in proportion to the development of the morbid action. An important characteristic of poisoning by mushrooms, as this physician has remarked, is the great *durability of the symptoms*. Even the narcotic effects of some fungi have lasted above two days; and ORFILA has adduced instances in which the gastro-intestinal irritation has continued from a fortnight to three weeks after the more acute symptoms had subsided.

676. When wholesome mushrooms disagree, owing to idiosyncrasy, the symptoms are chiefly those of severe indigestion, following upon, and often continuing a considerable time after, an attack of vomiting and purging. "There is some reason for suspecting that even the best mushrooms, when taken as a principal article of food for a long time, will prove injurious," and induce a peculiar depraved habit of body, leading to external suppuration and gangrene. Dr. CHRISTISON adduces from RUST'S *Magazine* an instance of a family who were seized with an intermittent fever, and an eruption on various parts of the body, of abscesses which discharged a thin, ill-conditioned pus, passed rapidly into spreading gangrene, and proved fatal to two persons. No other cause could be assigned for the concurrence of these symptoms in six persons in one family, than the circumstance of their having lived for two months almost entirely on mushrooms, the only person who escaped having merely slept in the house, but had his food where he worked.

677. Dr. CHRISTISON has directed attention to a fact, of which medical men should be aware, that poisoning may be, and actually has been, perpetrated by the intentional admixture of vegetable or mineral poisons with wholesome mushrooms; and that when the murderer is dexterous in the choice and mode of administering the poison, such cases may readily escape suspicion, and, even when suspected, might not

cleared up without difficulty. But in these cases the only decided proof of poisoning by some other substance mixed with mushrooms, or with preparations of them, is the actual discovery of another poison.

678. *C. The Appearances in fatal Cases.*—The surface of the body is generally stated to be livid, and the blood to be fluid; and exudations of blood are observed from the natural openings. The digestive canal is distended by fetid air, and in some cases presents inflammatory appearances, passing in places to gangrene. The stomach, unless there has been vomiting or diarrhoea, often contains fragments of the poison; and these fragments may be found as late as the second or third day, either in the stomach or in the intestines. The liver is often congested. The lungs are generally gorged. The vessels of the brain and its membranes are commonly turgid. In a case referred to by Dr. CHRISTISON, the arteries, as well as the sinuses, were distended with blood; the pia mater and arachnoid were of a scarlet colour, and the substance of the brain was red. The choroid plexuses were excessively gorged; and a clot of blood as large as a bean was found in the cerebellum.

679. *D. Treatment.*—Dr. CLENDINNING, in a learned and interesting lecture on poisonous fungi (*Lond. Med. and Surg. Journ.*, vol. vi., p. 168), remarks, that the remedies recommended by NICANDER consist chiefly of emetics and wine. Horseradish and mustard are among his vegetable means. White vitriol is also advised by him; and for drink or vehicles for solid medicines, oxycrate and wine. The first object is to effect the expulsion of the poison; and as there are no poisonous substances of equal power that take so long a time in developing their action as fungi, so there is none against which emetics may be administered with equal prospects of advantage at advanced stages, or after so long a period from the ingestion of the poison. There is no antidote to the poison of fungi known, and hence the expulsion of them should be the chief intention. After this end is attained, the inflammatory irritation, and the narcotic and other nervous symptoms should be allayed by means appropriate to the prominent features of the affection; by the means required for gastro-intestinal irritation and inflammation, when these predominate; and by the measures recommended for narcotic poisoning when this is the prominent character, more especially by cold affusions, external derivatives, and other means suggested when treating of opium poisoning (§ 658, *et seq.*).

680. *IV. HEMLOCK-DROPPWORT.—Eranthe Crocata.*—ORFILA states that this plant may be mistaken for hemlock, and that a single medicinal dose of the extract taken instead of the extract of hemlock might prove fatal. The symptoms are heat in the throat and stomach, delirium, stupor, and convulsions. Dr. PICKELS has collected thirty cases of death from eating the root. The symptoms were insensibility, delirium, and tetanic convulsions. Mr. HOWELL has mentioned eleven cases, of which two were fatal. The symptoms were chiefly convulsive, both in these and in eight others detailed by Mr. RAY. In a case described by Mr. HOLLISON, they were at first giddiness, rapidly followed by coma and violent convulsions. In

none of the fatal cases was life prolonged beyond four hours; and in several death took place within an hour. The *post-mortem* appearances are generally slight, consisting of inflammatory redness of the internal surface of the digestive canal and congestion of the brain. Portions of the roots are sometimes found in the stomach, as in the cases of four persons who were lately killed by this poison, out of fourteen who had eaten it by mistake. (See *Lond. Med. Gaz.*, May, 1844.) The treatment is the same as in cases of poisoning by fungi (§ 679).

681. *V. GRAIN, OF VARIOUS KINDS, is sometimes poisonous, owing to disease.*—*a. Spurred rye—Secale cornutum, or ergot*—is most commonly a cause of slow poisoning, in the form of a disease which is described, according to the form it assumes, under the articles GANGRENE and SPASM. (See, also, ERGOTISM.)—*Unripe grain, spoiled grain, mouldy bread or biscuits, or grain or bread of any kind*, which has become injured from keeping too long, or otherwise, will produce disease of a chronic or slowly developed form—a true state of slow poisoning—when made a principal article of diet, or when partaken of for too long a period; and if the grain, either before or after its preparation as food, be much injured, severe symptoms may appear from having taken it at a single meal.

682. *b. The symptoms usually produced by spoiled grain or bread are generally those of gastro-intestinal irritation, and but slightly or contingently those of narcotism; and, according to the nature and state of these articles, the symptoms may assume the form of acute or chronic diarrhoea, or dysentery, or of scurvy, or scorbutic dysentery, under which diseases the subject is fully entertained. Grain, however, may be injurious from other causes: from the presence of the ova of insects, or of a variety of minute insects; and from the admixture of some vegetable poison, as the darnel-grass, or some poisonous leguminous seeds.*

683. *VI. LABURNUM.—Cytisus Laburnum.*—The bark and seeds of the common laburnum contain an active poison called *cytisin*. Dr. TRAILL met with two cases of poisoning by the seeds; and Dr. CHRISTISON has reported an instance of chronic poisoning caused by the bark, the symptoms being chiefly those of gastro-intestinal irritation, of which the patient did not recover for some months. The symptoms in Dr. TRAILL's cases were coldness of the whole surface, lividity of the face, and complete insensibility. MM. CHEVALLIER and LASSAIGNE, who discovered the active principle, *cytisin*, in the seeds, gave eight grains in four doses to a man, which occasioned giddiness, violent spasms, frequency of the pulse, and consequent exhaustion. (CHRISTISON)

684. *VII. LEGUMINOUS SEEDS, especially the Lathyrus cicera and the Ervum cretita, or bitter vetch, have been found in France productive of chronic poisoning, chiefly in consequence of the accidental adulteration of flour with them. The symptoms have been usually weakness of the limbs, partial or complete palsy, or stiffness of the joints, and weakness and tremours of the lower extremities. They more properly belong to the class of depressing and paralyzing poisons* (§ 261).

685. viii. *LOLIUM TEMULENTUM*, or *darnel-grass*.—The seeds of this plant are irritant and acrid, and powerfully narcotic. They have proved deleterious, and even fatal, owing to accidental adulteration of flour or grain with them. Dr. CHRISTISON states, that when mixed in bread, darnel-grass has caused headache, giddiness, somnolency, delirium, convulsions, paralysis, and even death. M. CORDIER found, by experiment on himself, that very soon after eating bread containing the flour of darnel-grass, he felt confusion of sight and ideas, languor, heaviness, and alternate attacks of somnolency and vomiting. The bread was commonly vomited soon after he ate it. SEGER has related cases in which the somnolency was more deep, and general tremours also present. Many years ago, the inhabitants of the poor's house at Sheffield were attacked with symptoms of poisoning by porridge, which was supposed to have been made of meal accidentally adulterated by the darnel. The chief symptoms were a piercing stare, quivering of the lips, frontal headache, dilated pupil, and confusion of sight, small tremulous pulse, violent agitation of the limbs, twitches of the muscles, and palpitation. In twelve hours all those attacked were well but two, who had strong convulsions in the subsequent night; they also eventually recovered. (*Lond. Med. and Phys. Journ.*, xxviii., 182.) In some instances loss of speech and somnolency are the most prominent symptoms; while in others gastro-intestinal irritation predominates, occasioning vomiting and purging.

686. ix. *YEW-TREE*—*Taxus Baccata*.—The berries and leaves of the yew-tree are extremely poisonous, and sometimes act without either vomiting or purging. Dr. PERCIVAL states, that a table-spoonful of the *fresh leaves* was administered to three children, of five, four, and three years of age, as a vermifuge. Yawning and listlessness followed. The eldest complained of pain in the abdomen, and vomited a little; but the other two suffered no pain. They all died within a few hours of each other. Mr. TAYLOR adduces a case by Mr. HURT of poisoning by the berries of this tree. A child, aged three and a half years, ate some yew-berries, and about an hour afterward appeared ill, but did not complain of pain. It vomited part of its dinner, mixed with some of the berries. A medical man was sent for; but the child died of convulsions before he arrived. On inspection, the stomach was found to contain mucus and half-digested pulp of the berries and seeds. The mucous membrane of the organ was reddened and softened. Other instances of death by this poison are recorded, but they furnish no additional information. I believe that this poison acts as an *acro-sedative*, rather than as an *acro-narcotic*; but its effects have been very imperfectly observed.*

687. CLASS IX. SEPTIC POISONS.—This class of poisons has been doubted, or, rather, the op-

eration of certain poisons in rapidly dissolving the vital cohesion of the tissues, to and near which they may be applied, has been disputed; and, certainly, if any one were inclined to surrender the reports of more than one of his senses to the inferences of hypothesis, to such a one may doubts of the existence of this particular action appear reasonable. It is true that the poisonous agents which are thus capable of loosening, with more or less rapidity, the cohesion of living tissues, and of disposing them to enter into different physical conditions, are few; although many possess this power indirectly, or by giving rise to a succession of morbid actions, of which a septic condition, or a state of loosened or almost entirely dissolved vital and physical cohesion, is the most advanced. These latter, however, fall not under the present category; although the rapidity with which this ultimate result is produced, as respects some of them, might countenance such an arrangement. I may, nevertheless, allude to some of these incidentally. Dr. CHRISTISON observes, when noticing this topic, that "if we were to trust the impressions the vulgar entertain of the effects of the bites of serpents, the poisons now mentioned would be considered true *septics* or putrefiants, for they were once universally believed, and are still thought by many to cause putrefaction of the living body. This property has been assigned them, probably on no other grounds than that they are apt to bring on diffuse subcutaneous inflammation, which frequently runs on to gangrene." (*Op. cit.*, p. 575.) I confess myself possessed of the vulgar belief that the local effects of the bites of serpents are not inflammatory, however this much used and abused appellation may be qualified by certain adjuncts as diffusive or diffuse, gangrenous, destructive, sloughing, phlogistic, sthenic, asthenic, dynamic, adynamic, and twenty others, employed to convey certain ideas of morbid conditions, as they may suit a theory or subserve an hypothesis. But any one who has witnessed the bite of a poisonous snake, who has seen the swelling, infiltration of the tissues, the coldness, the arrest of capillary circulation, the softening and almost dissolution of the textures, and the subsequent rapid decomposition of the part and of those in its vicinity—all which takes place in a few minutes, and is consummated in an hour or two in some instances—may not consider the word *septic* as altogether misapplied, at least until a better one is supplied, or unless we submit to a periphrasis. But the more local alterations are not the only phenomena, for the remote effects, the extreme depression of organic nervous influence, and of the vital manifestations generally, are equally rapid and remarkable.

688. The poisons which most undoubtedly belong to this class are chiefly the secretions of snakes and other reptiles, although there is reason to believe that several other secretions or morbid matters will produce analogous changes in the healthy body when inoculated with them; that the secretions from smallpox, from plague, from gangrenous sores, from glands and farcy, from erysipelasous parts, and from sloughing, gangrenous or putrid animal substances, will so contaminate the parts into which they are inserted or inoculated, as to produce either a constitutional disorder specifically the

[* According to Liebig, no agent which does not contain nitrogen possesses a poisonous action in a small dose, and the medicinal or poisonous action of the nitrogenized vegetable principles has a fixed relation to their composition. It is evident, however, that the poisonous action is not owing to the nitrogen they contain, for *solanine* and *pirotozine*, which contain least nitrogen, are powerful poisons. *Quinine* contains more nitrogen than *morphea* and *caffeine*; and *theo-bromine*, the most highly nitrogenized of all vegetable principles, are not poisonous.]

same as that of which it is the product, or a state of local disorganization rapidly passing into vital destruction, accompanied by dangerous, and often fatal, constitutional disturbance. The inoculation of smallpox in the Negro constitution produces, in many instances, on some occasions—in the majority of cases in certain circumstances, as I have myself witnessed, a putrid or septic condition, the confluent eruption consisting of a black sanies contained in the softened dermis, which, with the circulating fluids and soft solids, rapidly deliquesce, as it were, into dissolution, before even respiration had ceased, and without any indication of antecedent excitement or unusual reaction.

689. I have seen the foul secretion from the throat of a patient about to die of scarlet fever produce sloughing of that portion of the integuments of another person with which it had remained for some time in contact, although the cuticle was stated to have been unabraded before the morbid secretion came in contact with it. The experiments of the French pathologists already referred to sufficiently prove the septic and disorganizing effects of putrid animal and vegetable matters when introduced into the healthy textures. It is supposed that, when a morbid secretion, or putrid animal secretion, occasions more or less of vascular injection of the part with which it comes in contact, or pain in connection with vascular injection or tumefaction, before disorganization ensues, this ultimate result is then the consequence merely of the morbid action more immediately preceding it, and that this action, more properly want of action, is inflammatory. But the truth is, that the septic agent, applied to the living part, deprived of its natural protection, or otherwise exposed, depresses the vital or the organic nervous endowment of that part, diminishes the tone of its capillaries, and weakens the vital cohesions of its tissues. As these changes proceed, the vessels are congested, the circulation through them is impeded, and ultimately ceases, and the part dies; although, in many instances, where the contaminating or poisonous agent is not sufficiently active thus to overpower or to annihilate the vitality of the part, and of the whole body, various attempts are made, by means of the vital resistance of the body, to oppose these changes, and to develop vascular reaction, whereby they may be the more successfully resisted. According to the intensity of the cause, relatively to the state of vital power and resistance, either of the part or of the body generally, or of both, will the effects, both local and general, thus vary; the more virulent or intensely contaminating or septic agents, destroying not only the part, but also the whole frame, and even hastening the physical dissolution of the body, without either vital resistance or vascular reaction being manifested, the less intense agents admitting of the development of both, in more or less efficient forms. In this latter case the septic tendency may be hardly apparent; and during the procession of morbid changes which the septic agent produces, congestion of, serous effusion into, and destruction of, the cellular tissue, and spreading inflammation and disorganization of the adjoining tissues are the most prominent organic lesions. My limits will not permit me to pursue the consideration of this

subject, which, however, is discussed at length under other heads, especially under CELLULAR TISSUE (§ 9, *et seq.*), DISEASE (§ 87, *et seq.*), ERYSIPELAS (§ 26, *et seq.*), INFECTION (§ 11, *et seq.*), and INFLAMMATION (§ 54, *et seq.*), while various specific maladies furnish illustrations, not only of the subject, but also of the principles for which I have contended, more particularly the HÆMAGASTRIC, AND THE SEPTIC OR GLANDULAR PESTILENCES, SCARLET FEVER, AND SMALLPOX. I therefore conclude with a brief notice of the effects produced by the poison of serpents, &c.

[In this connexion the reader will call to mind the remarks of LIEBIG relative to the *modus operandi* of poisons, which he illustrates by the fact that a body in the act of decomposition or change, added to a mixed fluid in which its constituents are contained, can reproduce itself in that fluid exactly in the same manner as new yeast is produced when yeast is added to liquids containing gluten. Thus, when *blood*, *pus*, *gall*, or *cerebral substance* is laid upon fresh wounds, vomiting, debility, and even death may be occasioned, as in dissection wounds, and poisoning by bad sausages, &c., the poisonous properties of which are destroyed by alcohol and boiling water.

There is certainly great plausibility in the doctrine that these substances communicate their own state of putrefaction to the same blood from which they were produced, exactly in the same way as gluten, in a state of decay or putrefaction, causes a similar transformation in a solution of sugar. So, also, poisons are generated by the body itself in particular diseases, as smallpox, plague, and syphilis, which have the property of reproducing themselves in like manner, or as seeds reproduce seeds. The peculiar power thus of animal poisons, at least, is probably owing to an active condition, recognizable by our senses, only through the phenomena which it produces.]

690. i. POISONOUS SERPENTS.—Many of this class of reptiles are more or less poisonous. The *viper*, or *Coluber berus*—*Vipera berus*—is the most common poisonous serpent in Europe; the *Cobra de Capello*, or *Coluber naja*, in the East Indies, and the several species of the *rattlesnake*, or *crotalus*, in America. But our information as to the genera and species of serpents or snakes which are actually poisonous is limited, notwithstanding what has been adduced by FONTANA, REDI, ATWELL, HORNER, ORFILA, and others. The bite of the *viper*, which is the only poisonous snake in Britain, seldom occasions death, although in other countries of Europe its poison is often much more virulent than in this; but the season of the year varies the intensity of the poison, which is greatest in summer and autumn.

691. A. The *symptoms* are acute or lancinating pain in the part wounded, commencing either instantly, or not for several minutes after the infliction of the injury, according to the intensity of the poison. The pain extends rapidly towards the trunk or centre of the body; and swelling, with redness or discoloration, passing to a livid hue, supervenes. These local changes are followed by faintness, or full syncope, bilious or convulsive vomitings, difficulty of breathing, copious cold sweats, dimness of vision; a small, quick, weak, and irregular pulse; yellowness of the skin; disturb-

ance of the mental faculties, and, in the most dangerous or fatal cases, the rapid progress of these symptoms and gangrene of the wounded part. Death may ensue, either rapidly or slowly; or recovery may take place, according to the virulence or activity of the poison relatively to the powers of the individual, or the aid and treatment he has received. Dr. WAGNER mentions two cases where the injury was on the toes, and death took place before assistance could be procured. In a case referred to by Dr. CHRISTISON, a burning pain was felt in the bitten foot, followed by intense pain in the belly, vomiting, incessant thirst, and death in three hours. Dr. BRAUN (*Russ's Magazine*, p. xxxii., p. 361) states, that a man who professed to be a snake-charmer, put the head of the *Coluber chersa* into his mouth, but suddenly threw the reptile from him, finding that he had been bitten near the root of the tongue. In a few minutes he became so faint that he could not stand. The tongue swelled a little, the eyes became dim, some saliva issued from his mouth, rattling respiration succeeded, and he died within fifty minutes after he was bitten. On the other hand, death may not take place until one, two, or even three days after the inoculation of the poison. The poison of the common viper is said not to be so dangerous in France as that of the *red viper*, which may cause death in a very few hours.

692. The activity of the poison of the viper, and indeed of all serpents, depends upon a variety of circumstances. When long confined, or after the animal has bitten frequently in rapid succession, and during cold seasons, when it loses its activity, the poison also loses its virulence more or less, owing either to a scantier, or a weaker, or an exhausted secretion. Serpents are most poisonous in warm, humid, and malarious climates, and are there most numerous. In those parts of Africa, which were chiefly of this description, that I visited, accidents from them were very frequent; but, owing to my residence at any place being short, I did not succeed in obtaining any of the poisonous species. The most dangerous bites are inflicted on naked or imperfectly-covered parts, particularly the extremities; and the more severe and virulent, the more rapidly are the symptoms developed. The poisonous properties of the fluid contained in the reservoir do not cease with the animal's life, but may continue, like some other poisonous fluids, as that of smallpox, &c., even when the fluid is dried and kept for some time. Professor MANGEL has demonstrated that it may be swallowed without injury. The *Fetish-men*, or native doctors in Africa, have in my presence, when sucking the wounds made by a poisonous serpent, swallowed the fluids thus drawn from the wound to show their powers and invulnerability.

693. The *Crotalus horridus*, or rattlesnake, produces effects which vary with the circumstances noticed above. Sir E. HOME states, that when the poison of this reptile is active, its local operation is so sudden and violent, and its effects upon the frame so great, that death soon takes place; and that, on examination after death, the only alteration of structure is in the parts close to the bite, where the cellular membrane is completely destroyed, "and the neighbouring muscles are very considerably

inflamed." But I can add, that the appearances of the muscles which are assumed as inflammatory are not actually such, but those of congestion and softening from loss of the vital and physical cohesion of the tissues.

694. When the poison is less virulent, the shock to the frame is rarely fatal. The pain in the part bitten is very severe, and in about half an hour swelling takes place from the effusion of serum into the cellular tissue, and continues to increase more or less rapidly for about ten or twelve hours, extending during that period to a greater distance from the wound. The blood afterward ceases to circulate in the smaller vessels of the swollen parts; the skin over them becomes quite cold; the action of the heart is so weak that the pulse is scarcely perceptible; a slight delirium is present, and the stomach is so irritable that nothing is retained on it. If the patient does not sink, these symptoms disappear in about sixty hours, and inflammation and suppuration take place in the injured parts, and when these are great the result is often fatal. The symptoms of those who recover go off more readily and completely than the symptoms produced by a morbid poison which has been received into the system. When the bite is in the fingers or toes, the part often immediately mortifies; and when death takes place in these cases, the absorbent vessels and glands present no change, nor has any part lost its natural appearance excepting those in the vicinity of the wound. The following cases illustrate the symptoms and morbid changes produced by this poison.

695. A person who took rattlesnakes from America to Europe for exhibition was bitten by one in Paris, and died in nine hours. On dissection, all the internal organs were found healthy, "excepting that the membranes covering the brain and spinal cord had a reddish tinge, and the venous blood on the affected side was curdled or clotted." (*Edin. Journ. of Science*, vii., 86.) Dr. HORNER states that a patient, whom he saw some hours after having been bitten in the arm by a rattlesnake, had the arm from the thorax to the fingers swollen to twice its natural size, and it was very painful when moved. The pulse was almost imperceptible; the extremities were cold; the eyes were muddy and heavy; the face bloated. Death took place twenty-four hours after the receipt of the injury, and five hours after death the body was examined. The face was then much bloated; the neck tumid and purple; the bitten arm was still swollen and purplish. The internal organs presented no lesion beyond congestion, which was most apparent in the vessels within the cranium and spinal canal. The cellular and adipose tissues of the injured arm were infiltrated with serum. The blood was fluid, and of a very dark colour. (*American Journ. of Med. Sciences*, vol. viii., p. 397.)

696. A man was bitten in London by a rattlesnake which was being exhibited. In less than half an hour the injured hand began to swell, and pain and swelling extended rapidly along the arm to the axilla. In two hours afterward the man's answers were incoherent, his skin cold, his pulse 100 in a minute, and he was sick at stomach. In eight hours the pain was extremely violent, the swelling very great, and he had frequent attacks of faintness.

The following morning his pulse was remarkably feeble, 132 in a minute, and slight swelling had extended from the arm along that side to the loins, with a mottled appearance from the exudation of blood under the skin. His whole arm was very cold and painful, presented several vesications, and "had a livid appearance, similar to what is met with in the dead body after putrefaction has commenced." On the third day his pulse was scarcely perceptible; the extremities were cold, and the vesications were larger. He rallied for a few days, but gangrene of the arm took place, and he died on the eighteenth day. Sir E. HOME, who records this case, adds, that Dr. RUSSELL communicated to him the details of a case of a man who had been bitten by the *Cobra di Capello*, and the symptoms were nearly the same as now stated. He also refers to two experiments he made on a couple of rats, which he caused to be bitten by a venomous serpent. The one first bitten died in one minute after the bite; and upon dissection, he found the cellular tissue under the skin of the side bitten entirely destroyed. The second rat was not so rapidly nor so severely affected, but it died in six hours.—(*Philosoph. Trans.*, 1810.)

[The *moscheto* and the small black fly deserve mention among insects whose bites are to some extent poisonous, and in a great degree annoying. A lotion of *vol. alkali*, properly diluted, is one of the best applications, and, as a preventive, smearing the parts exposed with camphorated volatile oil is generally pretty successful. We have found the bites of these insects so poisonous in the woods bordering on Lake Superior and our other northwestern lakes, as to cause such excessive inflammation and swelling of the skin as to obstruct the sight and cause general fever. Smoke, and every other means of defence, sometimes proved unavailing.*]

[* Dr. A. F. WAINWRIGHT of this city was recently bitten by a rattlesnake in the last phalanx of the middle finger of the left hand, near its articulation with the metacarpal bone, which was followed by a small jet of blood. The wound was immediately sucked, and in about half an hour after the bitten part was excised, and a ligature applied above the seat of injury. The limb, however, swelled rapidly, becoming mottled and adematous. The tumefaction extended to the parietes of the chest, and he died in a state of collapse in five hours and a quarter after the receipt of the injury.]

The particulars of the case, as detailed by Dr. A. C. POST (*N. Y. Annalist*, Feb. 1, 1848, p. 163), are as follows: From the nature of the parts involved in the wound, the incision must have been imperfect, but the excised surface was immediately cauterized. The ligature was tied firmly about the wrist, and ten grains *carbonate of ammonia* and half a grain of *sulphate of morphia* were administered; about seven and a half P.M., the ligature, after it had been on half an hour, was removed. Previous to this time the hand had been very much swollen, but no swelling had occurred above the ligature. It now began to extend up the arm. At nine and a half the patient was seen by Dr. P., when the swelling had extended to a point half way between the elbow and shoulder joint; it was very considerable, hard, and terminated abruptly; the finger, when passed along the arm, dropping suddenly from the swollen part to that in its natural condition. The hand was of a dark greenish colour; the lower part of the arm was mottled blue and greenish yellow; the discoloration did not extend as far as the swelling, and seemed to follow the swelling at about half an hour's interval. When first seen by Dr. P. the pulse was eighty, of medium fullness and strength, face flushed, and manner excited. Half an hour after the pulse began to flag, becoming less full and forcible, but increased to one hundred; it afterward reached one hundred and twenty beats in the minute, but became constantly more and more feeble. By eleven o'clock the pulse was extinct at the wrist, but could still be felt at the groin. Between ten and eleven he became stupid, taking

697. The *Coluber fulvus Australicus*, or "copper-coloured snake," has sometimes caused death or dangerous effects in Australia, where it and other allied species abound. In a case detailed by Mr. BLAND (*Lancet*, Jan., 1848), the bite nearly proved fatal, although ligatures were instantly placed upon the limb above the injury. The symptoms were pain in the region of the heart, with a feeling of constriction in the chest; acceleration of pulse; giddiness, jactitation, dimness of sight, and general distress, which continued for some time, but were ultimately removed by the very judicious and active treatment adopted.

698. *B. Treatment.*—When the situation of the bite allows of the application of a ligature above it, then this practice should be instantly adopted; and even two ligatures ought to be applied, especially if a considerable time is likely to elapse before professional aid can be obtained. When the situation of the injury admits not of the application of a ligature above it, then a cupping-glass, or any vessel or cup which may be applied with sufficient exhaustion of the contained air to produce pressure around the bite, as well as to draw the fluids through it, should be resorted to and kept applied, or reapplied as efficiently as possible. When medical or surgical aid is obtained, *excision* of the bitten part, if the situation admit of its performance, should be adopted, especially if the symptoms are urgent and the local contamination manifest. But when these means cannot be resorted to, and even when they have been already employed, *suction* of the wound should be as instantly instituted as possible, and continued without intermission for a considerable time.* The moderns have certainly not materially improved upon the treatment recommended by the ancients for the bites of serpents and other reptiles. If we refer to NISCANDER, DIOSCORIDES, CELSUS, and other Greek and Roman writers, as well as to the Arabians,

no notice of what was passing about him. This lapsed into complete coma, and he died a little past twelve. By this time the swelling had extended under the pectoral muscle, and the discoloration had reached the axilla.

The treatment consisted in the administration of stimulants, brandy and carbonate of ammonia, in as large doses as the patient could be prevailed on to swallow. When they could no longer be given by the mouth they were administered by the rectum, after the pulse had ceased at the wrist, and the surface covered with a cold perspiration. A sinapism applied to the epigastrium produced full redness in twenty-five minutes.

A fatal result from the bite of the rattlesnake is very rare in the United States, though bites are not infrequent. Dr. A. CLARK informs us that a man who kept these animals for exhibition stated that he had often been bitten, but that he possessed a remedy which always cured him. He was, however, at last bitten by a large one, and died in four hours. Cauterizing, with ammonia, immediately after animals, as cats and rabbits, are bitten, does not prevent a fatal result. In man the poison seems to attack especially the subcutaneous cellular tissue; the sloughing, when patients recover, being superficial. The phenomena bear no resemblance to those of ordinary inflammation, especially when death speedily results.]

[* In nearly, if not all, cases of bite from a poisonous reptile, *suction* should be the first measure resorted to. In many cases it will alone suffice to ensure a safe result. Ligature, caustic, and excision are important adjuncts. The free use of alcohol alone, or mixed with oil of turpentine, has been found very successful in our Western States, where rattlesnakes are said to abound. Hunters not infrequently carry a bottle, containing equal parts of these articles, as a specific in case they are bitten. We know of no plant possessing specific curative virtues in such cases as claimed by the Indians, and believed by some writers. Of these pretended specifics, more than a score are already known and described in our books.]

we shall find them all recommending the means now advised, with several others. Mr. ADAMS, in his most valuable translation of PAULUS ÆGINETA, has given an excellent epitome of the treatment prescribed by the ancients for poisonous bites and wounds. They all recommend ligatures, cupping, suction, and, in urgent cases, excision or amputation. After sucking and cupping the wound, they advise stimulating dressings, and the application of the flesh of fowls, while still warm, to the part. They also recommend bleeding, "when the poison is distributed over the body," but at the same time they give wine and stimulants, emetics, and sudorifics, and agree in GALEN's eulogy upon the virtues of the theriaca. I must, however, refer the reader to Mr. ADAMS's work for a very full account of the practice of the ancients in these and in all other cases of poisoning.

698*. In Mr. BLAND's case (§ 697), bleeding from the arm to the extent of sixteen ounces was adopted, "in conformity with his experience in these cases, and was followed almost immediately by the entire removal of both the pain and constriction." At ten the same evening the patient was again bled to ten ounces, some pain and constriction in the chest having returned. Besides the means already mentioned, Mr. BLAND advises "the exhibition of stimulants, as oil of turpentine, aromatic spirit of ammonia, brandy or other spirits, eau-de-luce, port, sherry, Champagne, or other wines." In addition to these, the head and face should be frequently sponged with cold fluids, as vinegar, rose-water, &c. I have seen, in Africa, where accidents from poisonous serpents are not infrequent, the juice of the citron, with capsicum, added to the other stimulants which were taken, and applied to the wound after suction had been continued for some time. The bowels were opened by means of olive oil, taken by the mouth with stimulants, or administered as enemata, with capsicum and salt. In the more intense states of poisoning by venomous snakes, bleeding can hardly be resorted to, owing to the extreme depression of the powers of life; and it is only when reaction is being developed by the aid of powerful stimulants that the loss of blood tends to relieve the vascular congestion produced by the poison, especially of the lungs and large vessels, and, by reducing the mass to the low amount of moving power, thereby to restore and equalize the circulation.

699. Various substances have been recommended as *antidotes* to the poison of serpents. HUMBOLDT and BONPLAND mention a New Granada plant, the *guaco*, *Mikiana guaco*, the juice of which is said to deter snakes from biting persons on whom it is applied; the leaves being also applied to the wound to prevent the usual effects when a person is bitten. (ORFILA, *Toxicologie*, t. ii., p. 441.) *Arsenite of potash*, and other preparations of arsenic, as the Pill of Tanjore, have been used in the East as an antidote to this poison. Dr. RUSSEL states that it was taken sometimes with success, but that it failed in other cases. Mr. IRELAND (*Trans. of Med. and Chirurg. Society*, vol. ii., p. 397) and Dr. PHILLIPS (*American Journ. of Med. Sciences*, vol. viii., p. 540) have furnished satisfactory evidence of the efficacy of arsenic, even in the worst cases of poisoning by the bites of serpents. Mr. IRELAND relates five cases in

which he prescribed the arsenic in very large doses. He states, that upon his arrival at St. Lucia, where venomous serpents are numerous, chiefly the *Coluber carinatus*, an officer and several men of the 68th regiment had died within a few months from bites of these reptiles; and notwithstanding the treatment, the patients had sunk in six to twelve hours from the time of their receiving the wound. The following case will show the symptoms and treatment of it and all the others.

700. A soldier was bitten in the hand, the middle finger being much lacerated, and it was immediately amputated at the joint with the metacarpal bone. He was seen ten minutes after he received the wound. He was then so torpid and senseless as to feel little or no pain during the operation. The hand, arm, and breast of the same side were much swollen, mottled, and of a dark purple and livid colour. He was vomiting, and appeared as if intoxicated. Pulse quick and hard. The wound being dressed, a cathartic elyter and the following were administered immediately: "R. Liq. Arsenicalis, ziii .; Tinct. Opii, gtt. x .; Aquæ Menthæ pip., ziss ." This medicine was added to half an ounce of lime juice, and taken immediately. It remained on his stomach, "and was repeated every half hour for four successive hours. In the mean time the parts were frequently fomented with common fomentation, and rubbed with a liniment composed of Ol. Terebinth., zss .; Liq. Ammon., zss .; and Olei Olivæ, ziss . The cathartic elyter was repeated twice, when the patient began to be purged; the arsenical medicine was now discontinued." From that time he gradually recovered. The next day he appeared very weak and fatigued; the swelling gradually diminished, and he soon recovered and returned to his duty.

701. The administration of large doses of ammonia and eau-du-luce has been advocated by many, and numerous instances of their success have been recorded, while HOME and ORFILA doubt their virtues. They are, however, useful in rallying the powers of life and in promoting perspiration. And in this way other stimulants, as alcoholic fluids in large doses, have also been of use. Many plants have likewise been much praised as antidotes to the bites of serpents, especially the *Aristolochia serpentaria*, the *Prenanthes alba* and *altissima*, the *Polygala senega*, the *Eupatorium ayaparia*, the *Ophioxylon serpentinum*, *Nux vomica*, &c.; but probably they possess no farther specific influence than in enabling, by their stimulating action, the vital powers to resist the injurious influence of the poison.

702. ii. VARIOUS INSECTS AND REPTILES, especially the *scorpion*, the *tarantula*, the *hornet*, the *spider*, the *wasp*, and the *bee*, produce serious effects in some constitutions by their stings. The effects of these, however, vary much. In some they resemble those produced by the bite of a viper; in others they are more slight, and are merely irritant locally, while they occasion more or less severe nervous symptoms.—A. The sting of the *scorpion* has, in some instances, produced severe diffusive local inflammation, with pain, fever, tremour, and depression. Dr. GRAPERON saw two cases in which the sting of the *tarantula* proved fatal in the Crimea—one in forty-eight hours, the other in six days. The sting, which was inflicted in the patient's neck,

was very painful, and had left a brownish violet mark. The neck, head, and shoulders were swollen; the thorax, from the clavicle to the false ribs, was of a bluish colour; and respiration became difficult forty-four hours after the injury. Scarifications, the actual cautery, oil externally and internally, and ammonia, were all employed in vain. (*Quart. Journ. of For. Med.*, i., p. 215.)

703. *B.* Dr. Beck refers to a case in which the sting of a *bee* caused vomiting, fainting, sweating, trembling, and great difficulty of breathing; and the sting of the *wasp* has caused similar effects, and sometimes even insensibility, with spasmodic twitchings. Dr. Beck refers in a note to a statement that Dr. King, of Stratford-on-Avon, died on the 14th of June, 1833, in consequence of a sting which he received on the 8th of the same month from a hornet.

704. *C.* The treatment of the stings of these insects should be the same in principle as that advised for the bites of venomous reptiles; which is similar to that prescribed by the ancients, an epitome of which will be found in Mr. Adams's work, already referred to. In the less severe cases, emollient and anodyne applications to the wound are of use, after the sting is extracted; and the volatile alkali, or the other stimulants and restoratives mentioned above, should be given internally in large and repeated doses, when vital depression is alarming, or the other general symptoms are severe.

¶ In this article it will be seen that I have ventured upon a different CLASSIFICATION of poisons than has hitherto been proposed; and that I have based this classification upon what I believe to be the operation of such substances as have been found to be more or less injurious to the living human body. It may be some reason for this arrangement, that there is scarcely a poison which is not, or has not been, employed as a medicine, and therefore some reference should be had, in our consideration of the *modus operandi* of poisons, to the nature and effect of these substances when employed medicinally; and, in fact, it is upon what is known, and upon what I believe, to be the influence and action of these substances that I have founded my arrangement. I offer it to the examination of the closely observing and profound pathologist, therapist, and medical jurist; and to several such I have been much indebted in the preceding pages. There are numerous substances, both medicinal and poisonous, which are arranged with great difficulty according to their operation and more prominent effects, owing to the circumstance of their operation taking place through different media and channels; and to the fact that the effects upon the different vital organs vary in different persons, from causes already stated, and even in the same person at different times, seasons, and states of the digestive organs, and of the economy. Hence substances which may appear to some to belong to a certain class, may seem, with equal justice to others, to belong to a different class. But this objection is one to which all arrangements are liable, where the objects to be arranged present not sufficiently distinctive characters on which specific differences may be based. There may be some imperfections in my views, and I may have to modify certain of them, especially as respects those substances the nature of which has been insufficiently investigated; but I have endeavoured to be as precise and correct as the extensive range of the subject and my limited powers allowed me to be; and I have endeavoured to do justice to all who have furnished me with information in their able and classical productions.

The reasons for my excluding chemical and juridical disquisitions from my treatise have already been given; but I may again state that they are not comprised by the scope of my work, or by its limits; and I am desirous that they should be referred to in the practical and able sources which I have already indicated. My object—and, indeed, my duty—was to describe the operation, the effects, the diagnosis, and the treatment of poisons, as a most important part of Practical Medicine—as, in truth, states of disease, although produced by art, or with the intention of destroying life—as no mean or small part of medical practice and usefulness—and as contributing in no small degree to the medical practitioner's knowledge, not only of the sources and course of the most intense and rapid states of morbid action and of

their results, but also of the operation and effects of our chief medicinal agents in alleviating and in removing spontaneous or natural maladies.

In order to facilitate reference to the PRINCIPAL TOPICS and to the INDIVIDUAL SUBSTANCES comprised in the article POISONS, I add the following synopsis, with the number of the paragraph at which the consideration of them commences.

- I. THE MODES IN WHICH POISONS ARE ADMINISTERED, &c., § 2.
- II. THE ACTION OF POISONS CONSIDERED, § 11.
- III. THE MEDIA OR CHANNELS BY WHICH POISONS ACT, § 18.
- IV. THE GENERAL EFFECTS OF POISONS, § 28.
- V. THE SPECIAL OPERATION OF POISONS, § 31.
- VI. THE CIRCUMSTANCES WHICH MODIFY THE EFFECTS OF POISONS, § 51.
- VII. A GENERAL VIEW OF THE SYMPTOMS OF POISONING, § 67.
- VIII. THE GENERAL DIAGNOSIS OF POISONING, § 73.
- IX. OF THE DIAGNOSIS OF POISONING DURING DISEASE, § 91.
- X. THE GENERAL PRINCIPLES OF TREATMENT IN CASES OF POISONING, § 98.
- XI. CLASSIFICATION OF POISONS, § 106.
- XII. OF THE SPECIAL EFFECTS AND TREATMENT OF POISONS, § 108.
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 - C. Oxalic acid, § 159.
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 - vii. Phosphorus, § 192.
 - viii. Salts.—Alkaline corrosive, § 196.
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 - k. Delphinium staphysagria, § 246.
 - l. Euphorbia officinarum, and other species, § 247.
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[Numerous cases of poisoning will be found scattered through the various American medical journals, so often referred to in our Am. Bib., viz.: Medical Repository, New-York Medical and Philosophical Register, American Medical Recorder, American Journal of Medical Sciences, Boston Medical and Surgical Journal, New-York Journal of Medical and Collateral Sciences, New-York Medical Gazette, New-York Annalist, Philadelphia Medical Examiner, &c., &c.]

POLLUTION.—**SYNON.** *Pollutions* (Pollutio—the act of polluting or defiling, corrupting or tainting); *Spermatorrhœa*; *Gonorrhœa vera*, *G. libidinosa*; *Anaplasmos*, *Manustupratio*, *Masturbatio*; *Onanismus*; *Tubes dorsalis*, *Profluvium seminis*, Auct. Var. *Samenfloss*, *Onanie*, *Selbstbefleckung*, Germ. *Incontinence de Sperme*, *perles seminales*, *Onanisme*, *Spermatorrhée*, Fr. *Pollutions, voluntary and involuntary*; *Self-pollutions*.

CLASSIF.—**GENERAL PATHOLOGY**—*Ætiology*.—**SPECIAL PATHOLOGY.**

1. **DEFIN.**—*Voluntary and solitary excitement of the sexual organs, occasioning emissions or the venereal orgasm* (self-pollution—voluntary pollution). *Discharge of the seminal fluid, with or without the venereal orgasm, involuntarily or during sleep* (involuntary pollutions).

2. Under the designations, *voluntary and involuntary pollutions*, I propose briefly to consider those moral and physical disorders which have been variously denominated according to the forms in which they have been presented to the medical adviser, or which they have assumed in the progress of moral depravity; not infrequently in connection with outward moral observances and hypocritical sanctity. That form of pollution, in either sex, which was at first voluntary, generally becomes involuntary when the evil habit is persisted in, although the latter, in certain circumstances, may occur primarily. It becomes, therefore, necessary to consider the different states of this important disorder in succession, inasmuch as the moral vice is generally the cause of the physical disease. Both states of the disorder should be viewed with a due regard to their special relations and consequences; for so remarkably important are these consequences—so numerous are the ills, both of body and mind, which this disorder induces—and so certainly are those ills entailed upon the subsequent life of the person who is its subject, and upon his offspring to the third and fourth generation, if, indeed, he possess the power of propagating his species, even in the most imbecile forms, that it becomes the duty of the medical instructor to point out its forms, relations, and consequences. The subject has been improperly neglected by both instructed writers and scientific physicians, because it is one frequently involving delicate ideas, and requiring unpleasant revelations—as the due consideration of it unveils the innate and concealed depravity of our nature. But the vice, the moral depravity, of which the disorder at first consists, soon creates for itself, in actual and often incurable physical disease, a necessity for disclosure—a necessity which is not confined to the person concerned, but extended to his family and his

offspring. This being the case with disorders and their usual consequences, which involve so extensive and important considerations, should they be relinquished by the only persons who are able to investigate them aright, and to restore the mental and the physical imperfections upon which they depend, and be handed over to ignorant harpies, who prey upon the wretched sufferers, who take the utmost advantage of the fears which torment them, of the moral and physical debility which sinks them, and of the circumstances in which they are involved, to deceive, to plunder, and to swindle them, and who have neither the knowledge, nor the ability, nor even the intention, to render them any aid!

I. SELF-POLLUTION—VOLUNTARY POLLUTION.—**SYN.** *Masturbation*—*Manustupration*—*Onanism*, &c.

CLASSIF.—**GENERAL PATHOLOGY**—*Ætiology*—*Pathogeny*.

SPECIAL PATHOLOGY.

I. CLASS. II. ORDER (Author).

3. i. **OCCASIONS, CAUSES, &c.**—I have already noticed, in a few sentences, the consequences of the too early and inordinate excitement of the genital organs in both sexes (*see art. Disease*, § 53); but the real importance of the subject induced me to mention merely certain prominent matters, and to reserve the fuller consideration of it to a more appropriate place. Self-pollution is generally a vice of *puberty*, but it frequently is often practiced at the earliest appearance of this epoch; and in females even long before the usual accession of this change. In both sexes, the habit is not infrequently continued through a considerable portion of after life. Several writers whose works I have perused have stated that they have known instances where this vice had commenced in females as early as three or four years of age; and cases of it have come before me when this age was hardly passed. At this early age, the practice has generally been acquired from the girls to whom the care of children has been committed. In a case of nymphomania, in a patient to whom I was called in consultation, and who was sixteen years of age, the intelligent mother, the wife of an eminent physician in India, stated that the disease originated in manustupration acquired from a native Indian nurse, when the child was only four years old. It is difficult to determine how early in life this vice may commence in the *male sex*. A patient who lately consulted me respecting his presumed impotence, stated that he commenced this vicious practice as early as eleven years of age; and I find, upon referring to my African memoranda, that it is common among negro boys of nine and ten years of age. But in this country, from thirteen years of age to twenty-five, and even upward, is the period in which it is commonly indulged, although its evil consequences are often found out before or soon after this latter age. At whatever period commenced, the habit is carefully concealed from parents and others; and is often not detected, nor even suspected, although both mind and body are reduced by it to the lowest state of imbecility.

4. It is requisite to be aware of the early age at which this vice may commence, as well as of the *circumstances* in which it commonly origi-

nates. One chief occasion of its early appearance has already been noticed; and this should suggest precautions, especially as respects the persons with whom children are allowed to sleep or to associate. Boarding-schools and other seminaries or institutions, where a number of children or young persons are brought together, and especially where several sleep in the same apartment, or more than one in the same bed, are the places where this vice is most frequently acquired, by both sexes; but it is not infrequently practiced by those who have never entered these places, it being either suggested by the local irritation and physical excitement often present during early puberty, or soon after this epoch, or acquired from tutors and governesses. The neglect of *circumcision* in Christian countries is certainly no mean physical cause of the prevalence of this vice, and of many of the consequences which follow. The institution of this rite for the descendants of Abraham, and the faithful observance of it to the present day not only by them, but also by the followers of Mohammed, have tended, amid numerous countervailing influences and persecutions, to perpetuate an enduring and healthy race; the beneficial results of circumcision being experienced not only by the individual himself, but also by his offspring, and even indirectly by the female sex, as may be inferred from various physiological considerations.

5. Although this vice is most prevalent among young persons, its ill effects generally becoming apparent to them with riper years, yet it is not infrequently indulged in, by persons of both sexes, during advancing years; and is generally the cause of most of the complaints observed in unmarried persons after the age of twenty-five years, as well as sometimes before that period. It is certainly the chief cause of the lives of this class of persons being of much less mean duration than those of the married.

6. There are few causes of this disorder more influential than idleness—than the want of such occupations for youth as require early rising. A full and active occupation of the mind generally shuts out all ideas which suggest this mischief, while the pleasures in which idleness favours the indulgence tend to encourage those ideas. Lying in bed after being awake is another occasion of no small importance—of much greater than is generally attached to it. Although this and several others of the foregoing causes may not have first occasioned this vice, still they remarkably favour a frequent recurrence to it, and often render the morbid impulse to it too strong for the self-control of the person who has fallen into the habit.

7. ii. THE SYMPTOMS AND SIGNS OF Masturbation are in some cases obvious almost on the first glance; in others, they require close observation, aided by experience of the several phases they assume. When the mischief has not been long indulged in, then the injury sustained by the organization is seldom such as to be manifest. But when it is commenced at an early period of puberty, or with the first indications of puberty, then its injurious effects show themselves much sooner than when the frame has previously been fully developed; and are much greater, especially at this early age, than the due congress of the opposite sexes. That

the injury done to the constitution by this vice is always much greater than that caused by sexual intercourse is certainly the case, although the act may not be oftener repeated in the former than in the natural way. As respects the female sex, this result may be easily accounted for; but it also obtains, and may be explained, as respects the male sex; for, independently of its being an act opposed to the dictates of nature and religion, it is one which exhausts the nervous powers more completely than the orgasm consequent upon reciprocal enjoyment, and the interchange of nervous emanations. But it should be recollected that self-pollution is often commenced at an earlier or more immature age than that at which the intercourse of the sexes can take place in the usual states of civilized society; and that hence it is the more injurious, because it impairs or interrupts the due development of both mind and body, at a period when such development receives, in the healthy frame, its chief impetus and full consummation from the genital organs and secretions. There can be no doubt, however, that the individual who has once devoted himself to this Moloch of the species becomes but too frequently its slave to an almost incredible degree. A patient who was sent to London for my advice confessed that he had practiced this vice seven or eight times daily from the age of thirteen until twenty-four; and he was then reduced to the lowest state of mental weakness, associated with various bodily infirmities; indeed, both mental power and physical existence were nearly extinguished.

8. a. The more prominent symptoms of self-pollution are readily recognized; but those which indicate an early stage of the habit are less manifest. In females, who often commence it long before, or with the earliest appearance of puberty, it is indicated chiefly by pallor or loss of colour, a desire to be alone, a somewhat dejected manner, listlessness and indolence, a desire to go soon to bed, and to lie long after having been awake; a darker mark than usual under the eyes, or of the lower eyelids; a dear or weak sight; slight emaciation, although the appetite is good or even ravenous; the habit of biting the nails, which are generally very short; warts on the first or second fingers, slight sores about the roots of the nails, &c., are signs often observed; and when several of them exist in the same case, suspicion of self-pollution may be entertained; and may be viewed as confirmed, if slight leucorrhœa, with redness and considerable development of the clitoris and nymphæ be present, and especially if the linen or sheets betray any marks or stains. Several of these symptoms may be observed in males; but the night-linens most commonly demonstrate this vice in them. They, however, often prevent it from being thus detected, and completely conceal it until their appearance sufficiently betrays them.

9. When self-pollution is not frequently practiced, it may be very long before it is detected—if detected at all; but when it is a frequent habit, the above symptoms then are not of long duration without being followed by others, which more decidedly indicate the mischief. The signs, however, vary with the age. When early practiced, or before the frame is developed, or while the frame is in course of devel-

opment, this process is more or less impaired, or even interrupted. The organic nervous influence and vital power are determined chiefly to the immature sexual organs, and all the other vital manifestations languish more or less. The functions of digestion and assimilation are weakened, the blood is poor and deficient in red globules and hæmotosin, and a state of anæmia is more or less completely produced. The muscles become flaccid, and the tendons, ligaments, and capsules relaxed and easily stretched. The nervous systems are weak, susceptible, readily excited or depressed, and ultimately betray farther disorder. Hence arise weakness of the joints, flexures of the spinal column, chlorosis, chorea, epilepsy, rheumatic or neuralgic pains, nervous headaches, and a general blight of the constitution, often associated with worms in the intestinal canal, and always attended by mental and bodily indolence, chilliness, and susceptibility of cold, and by incapability of intellectual and physical occupation. At this early age, or when puberty is either not commenced or is just appearing, the patient is often stunted in growth by this habit, or is rendered decrepit and imbecile, the ovary and the testes are imperfectly developed, and even waste more or less, and the beard in males hardly appears. I was first consulted by the parents of a young lady when she was about twelve years of age. She was then suffering from debility and slight anæmia; and subsequently she was the subject of chlorosis and tubercular consumption, of which she died about the age of twenty. She had never menstruated. When the body was examined after death, the ovaria were remarkably small, and changed to a dense fibro-cartilaginous state. It was ascertained during my attendance that she had become early addicted to masturbation; she ceased to grow at an early age, and was of a small and weak conformation, although her parents were large and strong persons. Most of those who thus early become addicted to self-pollution are soon afterward the subjects, not merely of one or more of the ailments already noticed, but also of enlargements of the lymphatic and other glands, ultimately of tubercular deposits in the lungs and other viscera, or of scrofulous disease of the vertebrae or bones, or of other structures, more especially of the joints.

10. *b.* When self-pollution is commenced at a more mature age, or when puberty is advanced or completed, the mischief which the constitution sustains is not so remarkable, nor so rapid in its progress as when practiced earlier; for the frame is then farther developed and more consolidated, and the powers of life furnish a greater resistance to the evil. Nevertheless, the consequences are generally most serious, especially when the vice is often indulged in; and, in some respects, are similar to those already mentioned, while those most frequently observed at this more mature age are not unfrequently seen also in younger persons. Stooping and roundness of the shoulders, with a falling inward of the thorax below the clavicles; emaciation and weakness of the joints; pallor of the countenance, with sunk orbits, the eyes being surrounded by a darker circle; a weak or dim sight, or nearness of the sight, weakness and pains in the eyes often preceding the

change in the focus of distinct vision; eruptions on the face; a falling out of the hair, and baldness of the crown and forehead; pains in the head, lowness of spirits, and aching of the back and loins, with inability of sustaining long an erect or even a sitting posture without support; marked aversion from leaving bed in the morning, and indisposition to enter upon any mental or bodily occupation, are the earliest indications of self-pollution at the more mature periods of life. To these succeed, sooner or later, loss of colour, a pallid state of the gums, tongue, and prolabia; sometimes a dusky hue of the countenance, with sores of the face, which are frequently picked and irritated by the patient; leucorrhœa, and delayed, or suppressed, or interrupted, or painful and difficult, or scanty menstruation; in some females, protracted or frequently-recurring catamenia; numerous hysterical symptoms, often irregular or anomalous, and attended by painful, or spasmodic, or slightly paralytic symptoms, and with all the phenomena noticed when treating of HYSTERIA and SPINAL IRRITATION. Ultimately, all the bodily functions betray increasing disorder, and special forms of disease succeed, particularly epilepsy, glandular and tubercular maladies, phthisis; palpitations of the heart from the slightest mental and physical causes, often protracted and excessive, and not unfrequently followed by organic changes of the parietes of the cavities, or of the orifices and valves of the heart; morbid states of the urinary functions and passages; hypochondriasis, and a morbid concentration of the attention upon the various changes and states of sensibility or of disorder, thereby aggravating these forms; melancholia, attended by various delusions, by unfounded fears, and a state of mental misery; and, at last, complete prostration of the powers of both mind and body, in various forms of partial or general insanity, or of incomplete or complete palsy; this latter affection often commencing as partial paraplegia, and advancing to incomplete general palsy of motion, the movements resembling those of chorea, and ultimately terminating in complete general palsy, with marked disorder of the urinary secretion and excretion.

11. *c.* During the progress of the ills which self-pollution entails, the digestive and the assimilating functions suffer more or less; the amount of disorder which these betray varying with the advantages enjoyed as respects food, air, exercise, and sleeping arrangements. But, generally, these functions and nutrition languish remarkably, and the bowels become habitually, sometimes obstinately, constipated. Among the most certain signs of self-pollution, especially in males, is premature baldness; but it should be admitted that it not unfrequently is also produced by low fevers as well as by venereal excesses. Abuses of the sexual organs are soon followed, not only by one or more of the maladies enumerated and by constitutional exhaustion, but also by more or less disorder and debility of these organs themselves, frequently amounting to temporary impotence and sterility. The frequent and unnatural excitement of these organs occasions an increased secretion of the prostatic fluid, and often, also, acute or chronic inflammation and enlargement of the prostate gland, and all the usual consequences; increased susceptibility and impaired

or exhausted function of the virile organs ; irritation of the seminal passages, and ultimately involuntary emissions, and wasting of the testes.

12. *d.* The mischief is seldom so rapidly manifested in the female as in the male, unless the practice commence before the full evolution of puberty. After this period, however, the evils which result depend much upon the frequency of the habit ; but these vary accordingly, the state of the constitution, temperament, and predisposition, also, modifying the effects. These effects have already been enumerated ; but they either cause, or are connected with sterility, which is generally owing to the changes produced in the ovaria by excessive, frequent, and unnatural excitement, and sometimes, also, in the uterus and Fallopian tubes. Independently of changes in the ovaria and tubes, and often antecedent to these, leucorrhœa is frequently present, and is sometimes followed by ulcerations of the os uteri, and numerous sympathetic ills which this state, in connexion with irritation of the ovaria and uterus, generally entails. The occurrence of ulceration, and the aggravation of it, are remarkably favoured by the means too frequently and officiously resorted to in ascertaining the nature of the uterine disorder ; for by these means the access of air to the seat of irritation oftener increases the mischief than the remedies prescribed tend to allay it.

13. *e.* The *evil consequences* of self-pollution are, however, not confined to the individual ; but, as already stated, are transmitted to the offspring, when the effects have not been such, as to kind and degree, as to prevent procreation. But when the constitutional powers, and more especially the sexual organs, of either sex are much weakened by this vice, either sterility is the consequence, or the offspring is delicate, puny, decrepit, or the subject of various congenital maladies, especially of the nervous system : to idiocy from deficient development of the brain, to hydrocephalus, to epilepsy, convulsions, palsy. The scrofulous diathesis, tubercular and glandular maladies, diseases of the vertebrae and of the joints, hydrocephalus, softening of the central portions of the brain, and tubercular formations in the membranes, palsy and convulsions, chorea, inflammations of the membranes or substance of the brain or of the spinal cord, and numerous other affections to which delicate infants and children are liable, very commonly result from self-pollution having been practiced by either of the parents previously to the married state. But the evil does not always stop at this epoch of existence ; it often extends throughout the life of the offspring ; or it appears only with puberty and mature age. The several diseases actually proceeding from tubercular deposits ; insanity, or mental weakness, or imbecility ; pulmonary consumption, chronic debility, or faulty or impaired development of the frame ; diseases of the spine and joints ; hysterical and neuralgic affections, epilepsy, and irregular forms of convulsion, partial or complete states of palsy, and various other affections not unfrequently appear, in consequence of the constitutional predisposition arising from the vice of the parent, and the faulty development and impaired nervous energy of the offspring.

II. INVOLUNTARY POLLUTIONS.—SYNON. *Invol-*

untary discharges of spermatic fluid.—*Spermatorrhœa.*—*Involuntary seminal discharges.*

14. *A.* This form of pollution is of very frequent occurrence, and generally follows the foregoing. When self-pollution has been practiced at an early age, or so frequently as to induce debility, or an irritable state of the sexual organs, involuntary discharges of spermatic fluid are often—indeed generally—the consequences of the relinquishment, or even of a temporary cessation of the voluntary acts. It has been believed, since the appearance of M. LAL-LEMAND's work on this disease, and of Mr. B. PHILLIPS's excellent papers on the same subject, that these discharges “are for the most part, if not altogether, caused by irritation set up in or about the ducts connected with the testicle,” especially at the termination of the seminal ducts in the urethra. Such is, doubtless, the case in many instances ; but it is much more generally only a part of the mischief ; the whole genital apparatus, more particularly the seminal ducts and vesicles, the ejaculator muscles, and the prostate gland having acquired, from the *vicious practice* above exposed, an irritability and susceptibility beyond the control of the individual. *This practice is the chief cause* of this morbid condition—of this often serious disease, which, if not corrected, generally induces other maladies, although, when it is only of occasional occurrence in robust persons, it is sometimes productive of little injury. Yet self-pollution is not the only cause. The next to it in importance are excesses in sexual intercourse, the constant excitement of the sexual organs ending in a morbid susceptibility, debility, and irritability of the whole sexual apparatus, manifested especially by the parts just named. Gonorrhœa, gleet, discharges, and strictures of the urethra are also, although much more rarely, concerned in the production of this disorder. The irritation of ascarides in the rectum, of hæmorrhoids, of fissures of the anus, &c., has also been considered as one of the causes of these discharges ; but I suspect that these morbid states are more frequently associated effects of the same causes—of masturbation and sexual excesses—than the actual occasion of the seminal emissions, even in those cases in which they coexist. However, whether the irritation of the rectum be a cause or a complication of the disorder now being considered, is practically of the less importance, that in either case it equally requires to be removed by suitable treatment.

15. *B.* The evidence of *involuntary spermatic discharges* is, as Mr. PHILLIPS correctly remarks, sufficiently clear ; but ultimately, and as the weakness of the organs increases, the ejaculation is unattended by the usual sensations, and the patient may then be unaware of the extent of the evil. It is not unusual, in such far-advanced cases, to find the spermatic fluid passed with the urine, or during efforts at stool, especially when the bowels are costive. In the latter circumstances, the fluid is squeezed out by the pressure on the seminal vesicles. The patient is, however, generally aware of the evil when the fluid is passed with the urine, because it almost always passes with the last drops, and can then be detected, and is attended by a certain sensation about the neck of the bladder. When the urine is examined soon after

it is passed, small granular diaphanous particles are found floating in it, or at the bottom of the vessel. Mr. PHILLIPS states, that when the evil is far advanced, no peculiar sensation is experienced, and the granular matter may be undetected, or may assume a more uniform cloudy appearance. The microscope most certainly detects the seminal fluid in the urine, for by its means the spermatic animalcules may be perceived in the deposit or cloudy portion of the urine. As debility of the constitution or of the sexual organs increases, owing to the great frequency of the discharges, or to other causes, "the fluid becomes thinner, and the animalcules much less numerous, and they may be almost, if not altogether, wanting."

16. *C. The general symptoms or consequences of involuntary pollutions* are necessarily, in most respects, the same as I have above stated with reference to self-pollution; for as the involuntary is generally caused by, or is a sequela of, the voluntary discharges, the results, as respect both mind and body, will generally be the same. One of the most distressing of these to the mind of the patient, is a state approaching, if not actually amounting to, impotency. In some cases, the impotency is owing more to the fears and anxieties of the sufferer than to the physical state of the organs. Mr. PHILLIPS has described this complaint so well, that I shall adopt nearly his own words. It is not that the seminal fluid is deteriorated, or incapable of determining fecundation, but it is that the organs are wanting in the energy necessary for projecting the fluid into the vagina; erection, if it exists at all, being momentary. The digestive functions become deranged, the bowels constipated, nutrition languishes, respiration is troubled, the voice fails, the heart's action is interfered with, even to such an extent as to induce belief of actual disease of that organ, and hypochondriasis becomes complete. These symptoms do not advance far without causing disorder of the nervous system, especially weakness, or failure of one or more of the senses; headache, with a sense of weight or pressure, loss of memory, timidity, apprehension, and various other affections and diseases, either similar to, or identical with, those already mentioned (§ 9, *et seq.*).

17. But the impotency which distresses the patient is not so often imaginary as it is real. The frequent seminal emissions are followed by a thinner and less fully elaborated secretion with a morbidly increased prostatic fluid; and the imperfect and momentary erections, and the rapid emissions, are insufficient to excite the female orgasm requisite to procreation in most cases, or at least to a healthy impregnation and offspring. The impotency, however, is not the only evil; for it soon becomes associated with others if the seminal discharges continue, most generally with epileptic or convulsive affections, with palsy, with pulmonary consumption, with mental delusions, or general insanity, with distaste of life, and thoughts of, or attempts at suicide, or with some other of the various maladies which I have already shown to follow frequent self-pollutions (§ 9, *et seq.*).

18. III. TREATMENT.—i. *Of Self-pollution.*—It is obvious that treatment must necessarily fail, or at best only lessen the ill consequences,

as long as this vice continues to be practiced. It should, however, be recollected that it is not only most necessary that this vice, in all its moral and physical consequences, ought to be exposed to the patient, and the entire relinquishment of it insisted upon, but that those who have, or ought to have, control over him or her should ascertain whether or not the prohibition be strictly observed; for the control of reason generally becomes so weak in these persons as to be quite insufficient to restrain those impulses which the occasions mentioned above (§ 4-6) too frequently favour or excite. It should not be overlooked that physical conditions and local irritations are often the causes of many of our most uncontrollable desires and passions; and that professional inquiries ought to be directed to the state of those organs which not only are influenced by these desires, but which instinctively excite the desires themselves, independently of reason and volition. There can be no doubt, as I have above stated (§ 4), that the occurrence of this vice is remarkably favored by the physical condition of the male genitals, especially as regards the neglect of circumcision. I am convinced that the abrogation of this rite among Christians has been injurious to them, in religious, in moral, in physical, and in sanitary and constitutional points of view; that circumcision is a most salutary rite, as respects not only the individual, but also the female whom he marries, and his offspring. He who devotes himself to self-pollution—to this modern Moloch of the species—should duly consider the severe denunciations and punishments which it provoked from the Jewish legislator, and observe its enervating effects upon himself, both mentally and bodily.

19. It is necessary, not only to procure a complete relinquishment of this vice, but also to restore the several functions—sexual, digestive and assimilative, nervous and mental—to their healthy conditions. As the manifestations of these several functions are more or less debilitated by this vice, the advice which I have given at full length in the article DENTISTRY (§ 29, *et seq.*) should be adopted and strictly followed in all its various details. Tonics, suited to the peculiarities of the case, ought to be prescribed, especially the chalybeate tonics, and mineral waters; and these should be aided by residence in a healthy air, by regular exercise, by full occupation, and by early rising. The patient should get out of bed instantly upon awaking in the morning, and have recourse, either to a shower-bath, or to the cold douche, or to the affusion on the loins and genitals of seawater, or water in which salt has been dissolved being preferred. He should sleep on a hair mattress, and not be allowed a longer period than seven hours for repose. If he or she be much weakened, two or three hours rest on a sofa may be allowed in the middle of the day, but sleep ought not to be permitted, as it must be reserved until bedtime. The diet should be sufficiently nourishing without being heating or stimulating, and the amusements and the reading be such as will not excite sensual desires. The mind, as well as the body, ought to be fully, agreeably, and profitably occupied, without inducing more fatigue than will favour sound sleep during the hours devoted to repose.

20. During the course of this treatment, the

digestive functions should be duly promoted and the bowels regulated. Costiveness will be best prevented by means of stomacheic aperients, as the compound infusions of gentian and senna conjoined, taken either early in the morning or at bedtime; and the impaired tone of the sexual organs and nervous system will be the most certainly remedied by the tincture of the sesquichloride of iron, with tincture or infusion of calumba, &c.; or by the sulphates of iron and quinine with the compound galbanum pill, or a vegetable extract; or by the iodide of iron in the sirup of sarsaparilla, or by such other preparations of iron and their combinations as the peculiarities and complications of the case will suggest. In many instances, and more especially in those which manifest a tendency to pulmonary disease, to disordered action of the heart, or to nervous headaches and affections, the *mistura ferri composita* will prove an excellent remedy; and, if there be any tendency to glandular or tubercular disease, the liquor potassæ and tincture or extract of conium may be added, or the iodide of iron or the iodide of potassium may be substituted. When self-pollution has been early or long practiced, the consequent states of anæmia and of nervous exhaustion require either an immediate recourse to chalybeates, or the adoption of them after vegetable bitters and tonics have been taken for a few days with alkaline carbonates, or with the mineral acids, according to the peculiarities of the case.—(See further the treatment advised in the article *DEBILITY*, § 29, *et seq.*)

21. *B. Involuntary Pollutions, or Spermatorrhæa*, generally originating in self-pollution, or in venereal excesses, require the same means as have been just advised. But these may not suffice to prevent the occasional or even the frequent recurrence of involuntary pollutions; for, although the *voluntary* emissions are discontinued, the *involuntary* may replace them in some form or other. LALLEMAND, PHILLIPS, and others have shown that the passage of a bougie, armed with lunar caustic, down to the seat of irritation, at or about the mouths of the seminal ducts, will remove this often distressing complaint. The application of the caustic is made by means of LALLEMAND'S instrument, which conceals the caustic until it has arrived at the seat of pain, which is usually a little in front of the prostate, and a little more than six inches from the orifice of the urethra. When the instrument has reached this point, then the caustic is uncovered, and that portion of the urethra brushed over with it. As soon as this has been done, the caustic is again covered and the instrument is withdrawn. This application occasions little uneasiness; with slight smarting upon passing the urine, and a discharge, which is sometimes considerable, and at first is thin and watery, but gradually becomes thicker, and in the course of a few days ceases. A feeling of improvement is stated by Mr. PHILLIPS to be early manifest in most instances, but the effect of the remedy cannot be estimated until the irritation has subsided. If by the end of six weeks, he remarks, from the application, a very decided amendment, or a cure, be not produced, it may be concluded either that an insufficient application of the caustic has been made or that the fatal habit of self-pollution is still persisted in. He has more than once ap-

plied too little, but he has never had to accuse himself of having applied too much. In any case a second application is indicated when the desired effect is not obtained from the first. He has never had occasion to make more than two applications, but circumstances might render a farther recourse to the remedy proper.

22. If the affection have been caused by inflammation of the urethra—by gonorrhœa or by gleet, or if it be consequent upon stricture, it may cease upon the removal of the primary disease. But if this result be not procured, then LALLEMAND'S treatment ought to be tried. When there is stricture, then the mechanical obstacle ought to be removed before this treatment is employed; but the existence of gleet need not prevent its immediate adoption. Mr. PHILLIPS states, that he has scarcely ever had recourse to a second application until five or six weeks have passed and given the assurance that the first has been insufficient. Of 109 cases, 84 were under 22 years of age; 97 admitted that they had practiced masturbation, and they referred this complaint to that cause. Every one, however, asserted that the habit had been discontinued—by some for a few months, by others for years; but in many cases he suspected the accuracy of the assertion.

23. I have been consulted by a number of persons of various ages, from seventeen or eighteen up to between fifty and sixty, who have been subject to this complaint. The most common age was from twenty to thirty-five; but almost in every case abuse of the sexual organs was confessed. In several instances the patient was married, and, in the majority of these, there was no family. Some of the patients were widowers. One gentleman, aged about fifty, married for ten or twelve years to a young and healthy woman, and has had no family, was addicted to self-pollution when young; but being of a robust constitution, and indulging in field-sports, he did not appear to have suffered. When he consulted me, he was liable to frequent involuntary discharges, and sometimes to two in one night, even although he may have had intercourse with his wife soon after going to bed. This, and similar cases, have shown that marriage, which will prove a cure of the complaint in many instances, will not always prevent its occurrence, or remove it when it depends upon chronic irritation of the mouths of the seminal ducts, and upon congestion and enlargement of the prostate gland, these morbid conditions co-existing in that case, but that it may even induce this disorder, and associated disease of the prostate, if sexual intercourse be too frequently indulged in.

24. In young and otherwise healthy persons, when the complaint has not occasioned complete impotency, although the patient may fear the existence of this state, or dread the accession of the loss of all sexual power, marriage will generally bring about the healthy state of the sexual organs, if they be very moderately and regularly exercised at the promptings of sincere affection in connexion with sexual desire. But it is always preferable that the complaint should be removed before the married life is commenced; and it should be imperative, when impotency more or less complete exists in consequence of voluntary, and its sequent, involuntary pollutions, that this state should not be

entered upon until the sexual powers are restored. When involuntary pollutions are complicated with enlargement, congestion, or inflammations of the prostate gland, or with gleet, strictures, or affections of the rectum, these must be altogether removed before marriage is advised; and in no case ought it to take place where the testes are soft and wasted, and the spermatic veins varicose, these lesions being often consequent upon, and associated with, the impotency following voluntary or involuntary pollutions.

25. Although LALLEMAND's treatment is very frequently successful, especially in the cases where irritation exists about the mouths of the seminal ducts, and in such as the one now mentioned, when it occurs in the married state, or is caused by venereal excesses, yet several cases have come under my care in which it had failed in the hands of expert surgeons; and the difficult task was imposed of removing, by strictly medical treatment, what surgical means, aided by medicine, had failed to remove. In most of such obstinate cases, the cure or alleviation of the complaint depends much upon the patient himself; for it is not alone sufficient that he has relinquished the vice in which the evil originated, but it is also requisite that he should so regulate the state of his feelings and passions—so direct his mind, as not to encourage sexual desires, and not to contemplate its disgusting consequences, as either kind of mental ruinination will only increase the evil. It will generally be far preferable for the patient to promote his general health and strength by regular living, and by regular and sufficient occupation, mental and bodily, avoiding fatigue and *ennui*; to regulate and promote the several digestive and assimilating processes; to increase the tone of the sexual organs by the means suggested above (§ 19, 20), and to proceed patiently for a time in this course, without injuriously exciting his imagination and desires, and as injuriously directing his attention to the disorder. During a life of celibacy, the discharge may occasionally occur without material injury; and as long as it is not productive of debility, of pains in the hack and loins, or weakness of the limbs and joints, or other disorder, and does not recur often, or more frequently than once in ten days or a fortnight, the injury done to the constitution will not be great.

26. It has been supposed by some physicians that the occasional occurrence of involuntary emissions must necessarily occur to a man who is perfectly continent. This is certainly the case very generally if the individual have devoted himself to self-pollution in early life, or been married, or been addicted to sexual intercourse, and has afterward become continent; but a person who has lived chastely during puberty and subsequent manhood, and occupied his mind and body rationally and usefully, without indulging prurient ideas, may pass these, the most likely epochs of life to be subject to this complaint, without experiencing it. The seminal fluid is secreted, nevertheless, and collects in the seminal vesicles; but as the susceptibility of these parts and of their associated organs is neither weakened by abuse, nor inordinately increased, nor unnaturally excited so as to produce the venereal orgasm, no abnormal discharge of it takes place, although the vesicles

continue charged, absorption of the secretion taking place co-ordinately with its elaboration; and thus, instead of proving *excrementitious* and weakening the frame by its absence or loss, it is actually *recrementitious*, and promotes nervous power, the cerebral manifestations, and all the organic and assimilative functions.

27. In young persons, especially those who indulge prurient ideas, or have devoted themselves to weakening self-pollutions or venereal excesses, the constant or frequent desire excites the sexual organs, distends the seminal vesicles, and augments the prostatic secretion, so that the simple contractions of the sphincters after fecal or urinary evacuations, or the passage of hardened feces, press out a portion of the contained fluids, which is partly, at least, seminal, as shown by the presence of spermatozoa, and partly prostatic, mixed with the last drops of urine from the membranous part of the urethra, when passed after micturition. In this class of cases the disorder ceases upon a due regulation of the mind, of the feelings, emotions, &c., and after the mind and body are duly and healthily employed. For these, especially when no disease of the prostate gland is present and the testes are quite natural, marriage may be safely advised. Although the patient may suppose himself almost impotent, owing to the prevalence of the discharge, and may actually be so for a time from his fears, or the impression on his mind that he will be found incapable, yet after marriage his fears subside, his powers return, and no longer is any sexual deficiency or disorder complained of.

28. It is often necessary, both as respects the mind of the patient and as to his scruples respecting marriage in his existing state, that medical treatment should be adopted, and some amendment procured before this state is entered upon, or even without reference to this state. If the means and regimen above advised (§ 19, *et seq.*) fail after a due trial, other remedies should be prescribed. The inurinated tincture of iron is usually recommended with the tinctura cythe, but they often fail; and in many cases the latter tincture is not appropriate. I have often given the former with the compound tincture of camphor and the infusion or tincture of calumba, and sometimes with decided benefit. When, however, there is pain or heat about the anus, with uneasiness or fulness in the perinæum, or any indication furnished by the excretion of urine or of feces, of irritation about the seminal ducts or prostate gland, or congestion of the latter, or any affection of the rectum, then local depletions from the perinæum and anus, soothing and gently aperient clysters, and much of the treatment I have advised for inflammation of the PROSTATE GLAND, should be adopted. I some time ago attended a case of successive self-pollution, involuntary seminal discharges and retention of urine, in which I had the excellent aid of Mr. FERGUSON. In this case there was superinduced, at an early age, enlargement of the prostate, spasmodic stricture of the urethra, mental weakness, and, as often seen in similar cases, the most cowardly fears of the introduction of a bougie. The nature of the complications, the habits of the patient, and his defective self-control, rendered both medical and surgical treatment only partially successful. In the simpler

cases, and where debility and susceptibility of the parts are the chief causes of the complaint, the tonics and stimulants already mentioned, the tincture of iodine in small and very gradually increased doses, the iodide of iron; a cautious trial of powdered nuxvomica or its extract or tincture, or of strychnia, or of stramonium; a recourse to blisters over the perinæum or over the sacrum; the application of the emplastrum thuris compositum over the loins; and various other restorative remedies, may be severally advised.

[We have found *ergot*, given in the form of powder and pill, very efficient in checking and controlling these discharges; nor is it less efficacious in relieving irritation of the urethra and prostate, on which these involuntary emissions so generally depend. Dr. C. L. MITCHELL, of Brooklyn, New York, has reported to us two very striking instances in which spermatorrhœa was cured by this agent after the other usual remedies had entirely failed. Its *modus operandi* is doubtless through the mediums of the lower portion of the spinal cord and the lumbar and sacral nerves thence proceeding; hence its efficacy in all diseases of irritation, congestion, and perverted secretion of the organs seated in the pelvic cavity.]

29. If the complaint be associated with ascariides in the rectum, or with hemorrhoids or other disorders of the rectum, these complications should be removed by the treatment appropriate to them. Pills containing the sulphate of iron, camphor, and asafetida may be taken, and afterward oleaginous clysters, with salt, camphor, and asafetida, may be occasionally administered for the removal of worms; and associated disease of the *prostate gland* and *hemorrhoids* should be treated as recommended under these heads.

[The remarks of Mr. PHILLIPS, referred to by our author, are so important, and the disease of which he treats is becoming so prevalent, that no apology will be needed for presenting the substance of his essay.—Ed.]

"Involuntary discharges are for the most part, if not altogether, caused by irritation set up in or about the ducts connected with the testicle. In some cases it may be doubtful whether the irritation by which they are excited may not have its seat in the rectum; primarily there is no doubt it may, but other cases would lead to the supposition that secondarily the mucous membrane of the urethra itself may suffer, and that, when the irritation in the rectum has ceased, that of the urethra may still keep up the mischief.

"There are particular modes in which the urethra irritation is commonly excited; among these, masturbation holds a prominent place; by this practice the constant excitement of the seminal ducts ends by establishing a permanent irritation there; it may likewise happen from excess in sexual intercourse. Next to this cause we arrange gonorrhœa or gleet discharges, which, from time to time, establish chronic inflammation in the vicinity of the orifices of the ejaculatory ducts. Then follows stricture, which, by opposing an obstacle to the free passage of urine, ultimately causes the development of a morbid condition of the mucous membrane between the stricture and the bladder. The same state of these organs may re-

sult from irritation within the rectum; that irritation may be caused by fissures or piles, or by the presence of ascarides.

"It is said that other causes are capable of inducing the same disordered action of the sexual organs, but as I profess in this place merely to point out such as have come within my own observation, I do not propose to consider others.

"The mode in which the irritation, once set up around the orifices of the ejaculatory ducts, acts, is very much the same as obtains upon the application of irritation to the mouths of other ducts; it solicits increased action in the organ with which they communicate. Irritate the bladder, and the kidneys are stimulated to increased action; irritate the conjunctiva, and the lachrymal secretion increases; irritate the duodenum, and it is said bile will be supplied in increased quantity: it is unnecessary to carry the illustration farther.

"How does masturbation induce this irritation? Within moderate limits it would not do so; but if you give any canal too much to do, you will ultimately develop irritation in it, more especially at its orifice. If urine be passed too often, in cystitis for instance, the orifice of the urethra becomes red, and the same thing happens to other conduits: it is in this way that masturbation or sexual excesses may develop irritation at the mouths of the ejaculatory ducts; it is in that way increased secretion is determined in the testicle; and thus involuntary discharges, consequences of masturbation or excesses, is explained.

"It is easy to explain how gonorrhœal discharges may induce a similar state of things; in many cases, and especially when the discharge is obstinate, the inflammation upon which it depends is extended backward until it reaches the neighbourhood of the prostate; where it may excite, on the one hand, the kidneys, on the other the prostate, and on the third the testicle, inducing each of those organs to furnish more than its accustomed supply. That the inflammatory action, under these circumstances, is likely to fix itself there, is shown in two ways: the existence of stricture so commonly near that region, and the acute pain experienced beyond the curvature when a bougie is passed. Often the inflammation may extend to the bladder itself. Often it passes along the spermatic ducts to the testicle.

"When the involuntary spermatic discharges are caused by stricture of the urethra, the immediate exciting cause is the same as when they are consequences of other circumstances; irritation of the mouths of the ejaculatory ducts. The irritation is then caused by the obstacle to the passage of the urine, and a state of chronic inflammation may be developed along the mucous membrane from the stricture to the neck of the bladder, and may even extend into that organ, or along the ejaculatory ducts. Irritation within the rectum, when long continued, may extend to the sexual organs, and occasion the discharges which we are considering. In some cases the source of irritation of the sexual organs may continue to be confined to the rectum, and when that ceases the spermatic trouble may also cease; but in other instances the spermatic disturbance may persist after the irritation of the rectum is cured. There is no

difficully in accounting for this circumstance; the irritation, originally anal, has ultimately become urethral also, and will only yield to treatment directly applied to that part. Every experienced surgeon has had ample opportunities of observing the intimate sympathy which exists between the bladder, and the urethra, and the rectum. How an irritable bladder may make an irritable rectum; how piles, or other affections of the rectum, will occasion trouble in the bladder; how the application of caustic within the urethra will now and then induce spasm of the rectum; how, in the efforts made to empty the bladder, in many cases of stricture, a corresponding effort will be made by the rectum; it may not always be easy to explain, but they are facts commonly observed. In most cases the evidence of involuntary spermatic discharges is clear enough, but the time comes when the ejaculation is unaccompanied by the ordinary sensations, and the patient may then be unaware of the extent of the evil. I have again and again known cases where the spermatic fluid passed out with the urine; others, in which the efforts at stool caused a pressure to be made upon the distended seminal vesicles, and thus their contents were squeezed out; but the fluid may not pass until the process of buttoning up is going on, and the evil may be undiscovered. Still, unless the disorder be very advanced, in most cases the person himself is aware of it when it passes with the urine, because it almost always passes with the last drops, and can then be detected, and because a certain sensation is experienced about the neck of the bladder. But when the medical man is consulted, he calls for the recently passed urine, or requests that it may be passed in his presence, and at the bottom of the vessel he perceives small granular diaphanous particles; and they are seen floating even before the urine cools; if the evil be, however, very advanced, no peculiar sensation is experienced, and the granular matter may be undetected, and may assume a more uniform cloudy appearance. In cases where uncertainty remains with regard to the deposit, we may advantageously have recourse to the microscope, by means of which the little long-tailed animalcules of the spermatic fluid can readily be perceived. Under any debilitating causes, whether those causes be found in frequent spermatic discharges, disease, or old age, the fluid becomes much thinner, and the animalcules much less numerous, and they may be almost, if not altogether wanting.

“One of the general symptoms resulting from too frequent spermatic discharges, which is most distressing to the sufferer, is a state approaching to, if not at the time, actual impotency. It is not that the seminal fluid, though deteriorated, is incapable of determining fecundation, but it is that the organs are wanting in the energy necessary for projecting the fluid into the uterus; the erection of the penis, if it exist at all, being only momentary. The digestive functions become deranged; the bowels constipated; nutrition languishes; respiration is troubled; the voice fails; the heart's action is interfered with, even to such an extent as to induce the belief of actual disease in that organ, and hypochondriasis becomes complete. These things do not advance far without caus-

ing trouble in the nervous system, manifested by some perturbation of the senses, by headache, with great sense of weight or pressure, and they are accompanied by loss of memory; a timidity and apprehension which are very painful.

“It must be evident to every one who takes the trouble to reflect on these things, that as the causes of these discharges are many, the treatment must also be variable. When the irritation is in the rectum, the case will require a very different course of treatment to one proceeding from stricture of the urethra. We will, therefore, make such general remarks as are proper with reference to the treatment of the several varieties of the affection which we have considered. First, when the cause is masturbation or sexual excess: The causes here are voluntary; the cure must also be voluntary. Lunar caustic will be powerless unless the patient has sufficient determination to abstain from the practice. But in many cases perfect abstinence will not suffice to put an end to the mischief; the *voluntary* discharges are got rid of, but they were persisted in so long that permanent irritation has been set up in the verumontanum, and that irritation may, as we have already explained, excite equally injurious *involuntary* discharges; and here a remedy must be found by the surgeon. The first thing we have to do is to introduce cautiously a bougie, to pass it down towards the bladder; but before it arrives there, the patient will complain of pain, which is sometimes very acute; and the point at which the bougie has then arrived is usually a little in front of the prostate. The surgeon must then carefully observe how far the penis has been extended, and a mark must be made upon the bougie to indicate the depth to which the instrument has penetrated, because that is the point upon which the lunar caustic must be applied. The depth to which we must penetrate must be marked upon the caustic instrument, which is then introduced and gently passed to the proper point, when the caustic is uncovered and the membrane brushed over; as soon as that has been done, the caustic is again covered, and the instrument is withdrawn. In some cases the patient complains of a little heat when the caustic is applied; in others, the sensation spoken of is a coldness. I have more than once known some discomfort, almost amounting to spasm, at the anus, but altogether it is astonishing how rarely any complaint is made. At the next time of passing the urine, more smarting is usually experienced; it may continue through the day, but it is very bearable. In all cases it occasions a discharge, which is sometimes considerable, and at first is thin and watery, but gradually becomes thicker, and in the course of a few days ceases. In a few cases the discharge is at first streaked with blood; and in a few rare instances there may be trifling hemorrhage.

“In most instances a feeling of improvement is early manifest, but the complete effect of the remedy cannot be estimated until the irritation has entirely subsided. Indeed, the amendment is almost always progressive, and frequently it happens that when, by the end of the second or third week, not much benefit has been apparently derived, we are astonished by the change which has been brought about in another fort

night. If by the end of six weeks from the first application a very decided amendment or a cure be not produced, we may conclude either that an insufficient application of caustic has been made, or that the fatal habit is still persisted in. It has more than once happened to me to apply too little, but I have never had to accuse myself of applying too much. In any case a second application is indicated when the desired effect is not obtained from the first. More than two applications I have never had occasion to make; but I can easily conceive that circumstances might render a farther recourse to the remedy proper. How the lunar caustic acts in extinguishing the morbid sensibility of mucous surfaces I cannot tell, but of its virtues in this respect few surgeons can be ignorant. Every day we apply it to modify the painful irritability of ulcers, as well as that of certain affections of mucous membranes. If the affection has been caused by a gonorrhoeal or gleet discharge, the treatment must be the same as in the former instance.

"If it has been caused by stricture, we must first restore the canal to its natural diameter; and it may be that the morbid state of the mucous membrane behind the stricture will gradually improve when the obstacle to the passage of the urine is removed, and that with the cessation of that morbid state may also cease those spermatic discharges which have been caused by it. But this conclusion is not inevitable; the obstacle to the passage of the urine may be removed, but the morbid condition of the posterior part of the canal, which has resulted from it, may persist; so may the specific discharges. Then the efficacy of the lunar caustic can be at once demonstrated; and a single proper and sufficient application of the remedy, with the precautions already indicated, will, in most cases, promptly cure the disease of the urethra, as well as that of the spermatic organs.

"If the discharges be determined by irritation of the anus or the rectum, appropriate means must be used to cure the intestinal disorder; and it may be that when that has ceased, the spermatic disorder will also cease. But it may persist, because a distinct irritation may have been determined in the urethra by the long-continued action of that of the intestinal canal; and to dissipate that, recourse must be had to the lunar caustic, under the same restrictions as have been already pointed out." *Medical Gazette*, Dec. 23, 1842, p. 452.

"Case 1 was a young man, aged 22, addicted to excessive masturbation, often twice a day, with frequent involuntary seminal discharges. The consequence was, complete derangement of the whole system; the sexual organs were extremely lax, the structure of the penis offering no feeling of elasticity when pressed between the fingers, and the scrotum almost as thin as a piece of linen cloth, the testicles hanging very low. On passing a bougie beyond the curvature, he screamed out, and this being the seat of sensibility, the lunar caustic was applied, as above directed, with the happiest effects. It was necessary to apply the caustic only once. Case 2 was a gentleman, aged 35, who formed an intimacy with a lady of rank in Russia, whose propensities were still stronger than his own. The consequence was, the most unbridled excess in sexual indulgences. On his return to

England he formed a similar connexion, which he only gave up when he found his health giving way. The seminal discharges were constant. On passing a bougie along the urethra, it was sensitive throughout, but especially so at a point in the neighbourhood of the prostate. In two days a bougie was introduced, in order to accustom the passage to the presence of a foreign body. The caustic was then cautiously applied without much inconvenience. In the succeeding three weeks the discharge only occurred twice, once in the first week, and once in the next fortnight. The case went on well in this respect, but he died of phthisis afterward.

"Cases 3, 4, 5, and 6 were nearly of the same character, with variation as to the cause; in all, however, the involuntary seminal discharges formed the chief feature in the disease with some tender part of the urethra. The caustic was invariably beneficial. Mr. PHILLIPS ends his valuable paper with the following remarks:

"1st. It is necessary that the habits which have led to those discharges should be discontinued; any means will be powerless if the practice be persevered in. 2dly. When the primary cause of the affection has ceased, it is necessary to examine the urethra with an exploring instrument; and for the purpose I prefer an elastic catheter. The point where the pain is most acute must be accurately noted. The instrument must then be passed on carefully until urine passes along it. Observe how far it has penetrated, and having noted this, you must arrange your caustic apparatus so that it shall not reach so far by an inch, because the prostatic portion of the canal is not commonly implicated in the irritation. The point upon which the caustic is to be applied is, as near as practicable, about the region of the orifices of the ejaculatory ducts.

"It may be asked, why pass the instrument on to the neck of the bladder at all, and why state that an inch in front of the neck of the bladder is the point beyond which the caustic instrument shall not penetrate? Why, again, the spot where acute pain is indicated, during the passage of the bougie, may not be regarded as the proper place for applying the caustic? In many persons the urethra is very sensitive, and the patient complains so frequently, that a little difficulty is experienced in deciding with that test; but when you have ascertained that from the orifice of the urethra to the neck of the bladder is seven inches and a half, and when you farther find that in the passage of the bougie the most acute pain was experienced at a little more than six inches from the orifice, you can then, with much confidence, canterize the space between the sixth and seventh inches, satisfied that the orifices of the ejaculatory ducts will not escape. It may be thought by some persons that all these precautions are unnecessary; this may be true; but off-hand surgery I dislike; and if in one case, by the neglect of such attention, I canterized the neck of the bladder, and in another case applied the caustic entirely in front of the seat of mischief, my conscience would not acquit me of blame.

"The foregoing precautions having been taken, the caustic must be exposed, and slightly revolved along the floor of the urethra for half a minute, without fear of harm, and rarely does it excite much pain; very rarely, indeed, does

the patient complain of it. A few days ago I passed a bougie very gently along the urethra of a young man, but it produced syncope. When the caustic was applied a few days afterward, the morbid sensibility was immediately blunted. Usually a smarting is experienced when the urine passes along the urethra after the caustic is used, but it rarely continues troublesome over twenty-four hours.

"Before that time usually a thinish discharge comes on, which may be profuse, and may be, though very unfrequently, streaked with blood. After a few days it begins to abate, and by the time it has ceased the change for the better in the patient's condition seems strikingly manifest. It is always necessary to guard the patient against impatience, because four or five weeks will, in some cases, pass before the beneficial effects of the remedy become clearly evident; and this is the more necessary, because he looks with intense anxiety to the result; and sometimes it happens that a single discharge, after the application of the caustic, will dash the cup of hope from his lips, and induce the most gloomy forebodings. I may again repeat what I have said before, that I have never applied too much caustic, but I have more than once failed by using too little; and much experience is necessary to apply the proper dose. However, it is better to err on the safe side, until experience shall have given confidence in the use of the remedy. I have scarcely ever had recourse to a second application until five or six weeks have passed, and given the assurance that the first has been insufficient."—*Medical Gazette*, Dec. 23, 1842, p. 452, and Jan. 20, 1843, p. 586.

"Since the publication of these remarks by Mr. PHILLIPS, the treatise of M. LALLEMAND 'On Involuntary Seminal Discharges' has been reviewed in the British and Foreign Medical Review, but as the treatment therein recommended is very similar to that adopted by Mr. PHILLIPS, we need not again dwell upon it. The reviewer remarks, that M. LALLEMAND may possibly be surprised that the armed bougie was adopted in similar, if not identical cases by Sir EVERARD HOME more than forty years ago. The following is the experience of three British surgeons on this subject, communicated to the reviewer by letter. One gentleman writes as follows:

"I can recollect eleven cases in which I have found LALLEMAND's treatment successful, and one in which I did not completely succeed. In seven of the eleven cases a single application of the caustic was enough; in four it was necessary to apply it a second time; in a single case two applications were insufficient to cure the disease, although the improvement was very great. The effects are immediate. A person in whom the discharge has continued for some months, will have none for some days after the use of the caustic; but in some cases, as the irritation subsides, it will come again."

"I have carefully noted," writes another gentleman, "twenty-seven cases treated by the nitrate of silver, either applied in the solid form to the prostatic portion of the urethra, or used in the form of injection. Of these cases, thirteen were completely cured; eight so much benefited that the emissions only returned occasionally, and produced but little effect on the

system; and the remaining five benefited by the period between the emissions being lengthened, though not to the same extent as the cases in the second series. The application of the solid nitrate, in many cases, produces very great irritation, sometimes complete retention of urine for a short period; in others, inflammatory irritation with bloody urine, lasting from eight to ten days, and even longer. These circumstances lead me to use solutions of the salt, one or two grains to the ounce, advising the patient to inject several times, at intervals of three and four hours, till a marked irritation was brought on; then to discontinue the remedy for a time, and to have recourse to it again, if the cure was not effected, when the irritation has subsided. The injections used in this way produce often great irritation and bloody urine, which continue sometimes many days. They have, however, in almost every instance, a beneficial effect upon the emissions."

"A well-known and experienced Scottish surgeon observes, 'With regard to LALLEMAND's method of cauterizing the urethra, I have tried it in above a dozen cases, and in the majority of them with decidedly good effects. In those distressing cases of irritability of the bladder where the prostatic portion of the urethra is chiefly affected; in certain cases of chronic disease of the mucous membrane of the bladder, and in that very prevalent and debilitating complaint to which young men are subject, nocturnal emissions, the efficacy of the practice is sometimes very striking. In the latter case, when the cauterization of the prostatic portion of the urethra fails, I have been lately in the habit, from a knowledge of the very intimate sympathy subsisting between the parts, of applying the cautery to the external orifice of the canal, and for about an inch down, and I think, in some cases, with more decided advantage.'

"The last communication we shall quote is the following: 'I have employed the caustic in several cases in private and at the hospital, and I entertain a very favourable opinion of its efficacy; indeed, in some instances, its good effects have been quite remarkable. I have used it successfully in cases of seminal emissions from self-abuse, sexual excesses, or in case of obstinate onanism, which affections appear to be attended with, and partly kept up by a morbid state of the prostatic part of the urethra. After using the caustic, I have found benefit from small doses of cubeb powder (gr. x.—xxx.) combined with the tincture of hyoscyamus, and also from steel medicines; the patient practicing, of course, the most rigid self-denial in respect to the cause of the complaint. The patients upon whom I have employed the caustic have not experienced the severe effects described by LALLEMAND as 'occasionally' resulting from it. The application which I make is always slight and transient, and the effects of it subside in a day or two. I have never had occasion to apply leeches to the perineum afterward, and in no case has swelling of the testicles been produced by it. The hip-bath and rest is all the treatment usually required; but I am generally obliged to make two or three applications of the nitrate of silver, and sometimes more, before the complaint is wholly removed.'

"In regard to caustic injections, as practiced

by the gentlemen whose notes we have quoted second and third, we have ourselves had no experience in *this* complaint, though, of course, in common with every practitioner, we have, times without number, ordered them in gonorrhœal and blenorrhagic discharges. We are disposed to think that the former of these two gentlemen considerably overstates the effects of cauterization as they usually manifest themselves, and we are also disposed to believe that the application of the solid caustic to the deep part of the urethra is less irritating and more effectual than the application of it in solution, and to the outer part of the urethra.

"The space which M. LALLEMAND usually cauterizes is from the neck of the bladder to the membranous part of the urethra; but sometimes he brushes over the internal surface of the bladder itself to a greater or less extent. He cautions us strongly against repeating the operation too soon; and advises us to wait two or three weeks before we reapply the caustic. Many of his cases appear to have been cured by a single application. Pain, and a slight discharge of blood, but never amounting to hemorrhage, seem to have followed some of his operations; but these consequences disappeared at the end of from twelve to forty-eight hours. In one case they are described as lasting three weeks, but this is mentioned as a rare exception. When the emissions have been diurnal, M. LALLEMAND regards the conversion of them into nocturnal, and the fact of the emissions being once more accompanied with erections and with pleasurable sensations, as a sign of the favourable effects of treatment and prospect of cure.

"We shall now, with great brevity, advert to other modes than cauterization, of treating involuntary seminal discharges, depending solely on chronic inflammation of the prostatic portion of the urethra and of the vesiculæ seminales. The daily introduction of a bougie, and the retaining it for a longer or shorter time in the urethra, may first be mentioned. This, as our own observation enables us to testify, is often useful. Leeching of and blisters to the perineum are by no means of slight efficacy, especially where the prostate is tender and enlarged. We have also prescribed tartar-emetice frictions of the perineum with excellent effects. A total abandonment of masturbation, and a moderate use, or even an entire though temporary disuse of coition, are, of course, indispensable measures. One of our correspondents states, that he has found opiates extremely useful. They are so in most cases, though not in all, since they sometimes seem to augment the disease. Conium is safer; and both it and opium may be used both constitutionally and as a suppository. Cold clysters are often of benefit. As regards general means, alcoholic and malt liquors must be abandoned. M. LALLEMAND's opinion of these is exceedingly hostile; and we believe he is right in this. The food should be nourishing, light, and unstimulant; the bowels should be, of course, attended to, and, as a general rule, country air and exercise prescribed. Among medicines and articles of diet, tea and coffee in excess, tobacco, camphor, nitrate of potass, aloes, must be abstained from."—*British and Foreign Medical Review*, April, 1843, p. 357.

We have been politely favoured with the

following letter, on the treatment of spermatorrhœa, from our friend, Dr. F. CAMPBELL STEWART, of this city, whose very extensive experience and success in the treatment of the disease is generally known to the profession, and our limited experience in its management leads us to the same conclusions as expressed by Dr. S.—Ed.

"I have used LALLEMAND's instrument, and pursued his method of treatment for involuntary emissions for several years, and I am decidedly of opinion that it is preferable to any other that I know of. My own modification of the original *porte caustique* (described with a wood-cut in the xxiii. No. of HAYS's *American Journal*, &c., July, 1846, p. 265) I have used exclusively for three years past, and I think it possesses several advantages over that of LALLEMAND.

"The number of cases of this disease in which I have cauterized exceeds fifty, and the result has been almost uniformly successful. I allow the caustic to remain in contact with the prostatic portion of the urethra for from thirty seconds to one minute, and never for a longer period. My patients are always prepared for the operation by the frequent introduction of wax bougies, and they are kept quiet for a day or so after each application of the nitrate of silver. I have very rarely had to repeat the operation more than three times, and always allow an interval of from one to three weeks between each application.

"The result of my experience is entirely satisfactory, and the caustic has failed in three or four cases only, and these were aggravated. Accidents have ensued once or twice. I have had one troublesome hemorrhage (within six hours after operation), and abscesses have formed in two cases at the margin of the anus, which were very painful and tedious of cure. The patients ultimately recovered, however, without fistulæ or any other unpleasant consequences ensuing.

"I have tried most of the other means recommended in this complaint—pressure, leeching, camphor, potassa, &c., &c.—but without any marked benefit; and, with the exception of a combination of camphor and extract of lettuce, which I generally give my patients in small doses, and at night, when they are undergoing the caustic treatment, I consider them as almost wholly useless.

"I find the disease to be very common among the middle-aged and young men of our country, particularly those belonging to cities; and I have more than once treated married men for it.

"As to regimen, clothing, exercise, dancing, &c., I always advise my patients to pursue the course that is universally recommended as preventive of the unfortunate habit of onanism, which is undoubtedly the most fruitful of all the causes of spermatorrhœa. A Dr. KAULA, of Paris, who was formerly a pupil of LALLEMAND, has recently published a quarto volume on the subject of this disease, accompanied with the details of a vast number of cases. His experience confirms all that I have said of the caustic treatment, which he considers the only means by which a radical cure can be obtained. We also agree in our views in regard to the serious and distressing nature of the malady, the anxiety and misery occasioned by which can scarcely be exaggerated."]

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[The American reader will find the Essay of Mr. Philips in *Braithwaite's Retrospect*, No. vi., 1843, p. 119, 120, 121, &c. See, also, Review of *Lallemand* in British and For. Med. Review, and Amer. Journ. of Med. Sciences.]

POMPHOLYX.—See PEMPHIGUS.

PORRIGO.—See TINEA.

PREGNANCY.—THE PATHOLOGICAL AND THERAPEUTICAL RELATIONS OF.—DISORDERS INCIDENTAL TO PREGNANCY.

CLASSIF.—GENERAL PATHOLOGY.—*Semeiologia*—GENERAL THERAPEUTICS.

1. A change is produced in the uterine organs by impregnation, which affects, sympathetically, the female constitution variously, according to temperament, diathesis, habit of body, predisposition, and age. The more constant and slight changes may be viewed as *physiological*, or as the natural and healthy consequences of the new action imparted to the uterine organs; those which are characterized by more or less derangement of function may be, with equal justice, considered as *pathological*. But there are other considerations besides these which relate to the physiological and pathological relations of pregnancy that will engage the mind of the physician when he is required to treat these disorders, to which pregnancy may predispose, or which it may more directly occasion; and these considerations have strict reference, not only to the treatment required in the particular circumstances of the case, but also to the effects which such treatment may produce upon the state and progress of utero-gestation. Moreover, the pregnant female is not only liable to certain disorders incident to this state, but also to others, in common with the species—to other maladies which attack all who are exposed to their causes. Even in the course of several chronic diseases pregnancy may take place, with or without modification or change of that progress and termination; and thus the pregnant state is most important in respect of the course, termination, and treatment of diseases which occur

during its course, as well as of those which had previously existed. The propriety, therefore, of devoting due consideration to the subject cannot be disputed. I have, however, to regret that my limits admit only of a very succinct account of the several topics which the subject comprises.

2. I. THE LOCAL AND SYMPATHETIC CHANGES CONSEQUENT UPON PREGNANCY.—Impregnation induces a remarkable change in the state of the uterine organs. The nerves with which these organs are supplied experience a more continued state of excitement, and probably even an increased development. The blood-vessels and lymphatics increase in size, and their actions are augmented; and while these organs become generally more vascular and more excitable, the uterus itself augments in volume with the progress of the contained embryo. The ganglia and plexuses supplying the sexual organs are intimately associated, as I have shown in the article SYMPATHY, and in the CROONIAN LECTURES (*published in the Medical Gazette*, vol. xl.) by means of communicating branches of nerves, with the other ganglial and sympathetic nerves, and with the spinal cord and its nerves, both sensory and motory, with, in fact, the ganglial and the cerebro-spinal nervous systems, from both which these organs derive their energies, and upon, as well as through the media of, these systems, they produce their numerous and varied sympathies. That the uterine nerves, plexuses, and ganglia experience, with the development of the ovum of the uterus and of the uterine vessels, an augmentation of their size, was an opinion entertained by W. HUNTER, and subsequently confirmed by TIEDEMANN and R. LEE. With this remarkable increase of vital action, and of material or structural development of all the constituent tissues of the organ, a more exalted degree of sensibility is imparted, through the media of the organic and cerebro-spinal nervous systems, to the whole frame, which thus participates, more or less, in the excitement and vital activity of the uterus.

3. When it is considered that during pregnancy the uterus, and, consequently, its constituent tissues, are undergoing a process of development, which Dr. MONTGOMERY has shown to amount, at the full period of utero-gestation, to 519 times its virgin capacity, and to twelve times its solid substance, it cannot be a matter of surprise that so remarkable a change should be attended by numerous sympathetic phenomena, and that this organ, having become the centre of most important vital actions, should also be the source of various influences and derangements, manifested both by adjoining and by remote parts, during the progress of that change and of the development of the embryo with which it is associated. The remarkable increase of the functions of assimilation, circulation, and nutrition observed to follow the appearance of puberty is often exceeded during pregnancy; the excitement of the uterine functions, tending more remarkably, than the first evolution of these functions, to develop all the vital actions and manifestations—to increase the general sensibility and susceptibility, to augment vascular fulness and plethora, and to promote the several secretions and excretions, excepting that excretion furnished by the uterus itself. As consequences of these sym-

pathetic changes, and of various predispositions depending upon temperament, diathesis, habit of body, and previous disorder, numerous ailments arise in the course of pregnancy, as well as others which this state is not concerned in producing.

4. Other disorders also occur in the progress of pregnancy, which depend, more or less, upon the mechanical influence which the increased size of the uterus exercises upon the adjoining viscera, and probably also upon sympathetic excitement, or upon irritation, caused by vascular determination to this organ. As the uterus enlarges within the pelvis, the rectum, neck of the bladder, and urethra experience increased pressure, and some disorder of the functions of excretion is often thereby produced, with pain in the back, and various sympathetic affections of a transient or varying character. As the uterus enlarges farther and rises above the brim of the pelvis, the urinary bladder is often pressed upon so as to diminish its capacity, and to occasion frequent calls to pass urine, or even some degree of incontinence of urine. When the womb has nearly or altogether acquired its utmost size, the mechanical effects produced by it may not be limited to the abdominal viscera, but may extend to the thoracic cavity, occasioning thus disorder of the functions of one, or of several organs. The stomach, duodenum, biliary organs, kidneys, and colon have their functions impeded or disordered; and indigestion, jaundice, constipation, and pains in the back and loins, and changes in the state of the urine are often complained of. The mechanical disturbance extends upward, the diaphragm being pressed so high as to diminish the thoracic cavities, and to disturb the functions of the lungs, and sometimes also of the heart, occasioning dyspnoea, short breathing on slight exertion, and embarrassed circulation through the cavities of the heart. The pressure, also, upon the veins and absorbents within the pelvis occasions a varicose state of these vessels, oedema, pains of the limbs, numbness, or neuralgic affections. In some cases, especially in females having a small pelvis or abdomen, or who have borne several children, the muscular and integumental parietes become relaxed or pendulous, admitting of malpositions of the uterus.

5. II. AFFECTIONS OF THE UTERINE AND GENITAL ORGANS AND OF THE MAMMÆ, CAUSED BY PREGNANCY.—DISORDERS OF RELATED PARTS.—

i. OEDEMA OF THE LABIA VULVÆ occurs chiefly in females far advanced in pregnancy—during the 7th, 8th, and 9th months. It disappears immediately after delivery, and is caused chiefly by the pressure of the gravid uterus, especially when descending into a large pelvis. It is much augmented by a sitting or standing posture, and is characterized by a tense, colourless swelling, of equable density, often pitting on pressure, and by absence of throbbing and of increased heat. The oedematous labia may be attacked with erysipelas shortly before or after delivery, and the utmost danger, or even death, may result; or they may be the seat of simple excoriations.

6. *Treatment.*—A mild aperient, repeated occasionally, the recumbent position, and bathing the parts with a suitable lotion, will generally remove the affection. In some instances, di-

retics may be necessary: or even puncturing the oedematous parts, so as to allow the discharge of the fluid. If inflammation or erysipelas occur, the treatment should depend upon the peculiar features and circumstances of the case.

7. ii. PRURITUS OF THE VULVÆ.—This is often a very troublesome affection, and frequently connected with a leucorrhœal discharge [ascarides in the rectum], or with an aphthous state of the vulva and lower part of the vagina, or with a state resembling an eruption of small papulæ. It is generally referable to the active vascular determination to the sexual organs, consequent upon impregnation.

8. *Treatment.*—Lotions of acetate of lead, [hydrocyanic acid], or of nitrate of silver have usually been prescribed for this affection. I have generally added a little vinum opi to these. Lotions consisting only of tar-water will generally prove efficacious. In the summer of 1826 I was consulted by a surgeon in an obstinate case, for which the usual means had been employed. I advised a saturated solution of borax in rose-water; and this proved successful. Since that time I have generally prescribed this substance for similar cases. Dr. CHURCHILL states, that a decidedly antiphlogistic treatment may sometimes be required; as venesection, leeches applied to the vulva, and one or two smart purgatives. [Sometimes the stramonium, belladonna, or creasote ointment will succeed in affording relief.]

9. iii. LEUCORRHŒA is generally caused by the increased determination of blood to the uterine organs during pregnancy, and probably, also, in part, by the pressure of the gravid uterus. It sometimes occasions great debility, and increases the aching of the back often complained of during pregnancy. It may, when excessive in the early months, cause abortion; but at an advanced period it is not very injurious, otherwise than by producing or increasing debility.

10. *Treatment.*—The propriety of removing or suppressing this discharge ought to be considered before any treatment is ordered for it. In many cases, the inconvenience is not so great as to require treatment. But in some instances the discharge is so exhausting as to require to be moderated, if not altogether arrested. To strong, plethoric females, and where the disorder proceeds from active determination of blood to the uterine organs, a moderate venesection and cooling aperients will prove beneficial. In weak or delicate females, and when the digestive organs are disordered, the bitter infusions, as those of cheyreita or of calumba, with small doses of the muriated tincture of iron, or with a mineral acid, will be of service. If the discharge occur in connexion with any pulmonary affection, it may be moderated by internal remedies; but it should not be arrested by powerful astringents. (*See art. LEUCORRHŒA.*)

11. iv. MENSTRUATION DURING PREGNANCY, or, rather, a periodical discharge of a sanguineous fluid from the vagina, have been occasionally observed. This discharge may occur once or oftener during utero-gestation, and after irregular intervals, but it most frequently takes place at the menstrual periods, and in some instances it returns for three, four, five, or six months, or even for the whole period of pregnancy.

DRS. DENMAN and HAMILTON have doubted the occurrence of these discharges, a skepticism the more remarkable considering the great experience of these physicians, and the frequency of the phenomenon according to the observation of very eminent practitioners. Although I have never been engaged in the practice of midwifery, yet I have been consulted in two cases in which this discharge was stated to have occurred regularly during four or five successive menstrual periods; and not in one pregnancy only, but in each of several occasions of utero-gestation. Neither of these patients had ever had an abortion. The discharge was represented to have continued from three to four days, to have become paler than usual after the second day, and to have passed into a moderate leucorrhœa. It does not appear to be attended with any inconvenience to the patient beyond increased aching of the back and loins. The growth of the child is not affected by it; although, judging from the instances which I have seen, the constitution is rendered more delicate; so that the aphorism of HIPPOCRATES, "that the children of women who menstruate during pregnancy cannot be healthy," appears partly true. The discharge probably proceeds from the vessels of the cervix uteri and vagina, in consequence of the more than usual vascular determination to the uterine organs during pregnancy, the periodic recurrence being the consequence either of ovarian excitement and influence, or of habit.

12. *Treatment*, in most instances, is unnecessary, or nearly so. In one of the two cases which I have alluded to, the lady who was its subject had four children, and this discharge occurred during each pregnancy. Nothing beyond the recumbent posture, and quietude as long as the discharge continued, was prescribed. Three of the four children are living and well, but are of delicate constitutions. HIPPOCRATES advises cupping over the mammae, and MAURICEAU bleeding from the arm. Neither of the cases which I saw required any depletion.

13. V. WATERY DISCHARGES FROM THE VAGINA have caused some discussion as to their source or sources. The fluid has been referred to the glands of the cervix uteri, but they cannot be supposed capable of furnishing so abundant and so clear a fluid; although these glands and those of the vagina often furnish a copious inucous secretion. The fluid is more probably collected between the amnion and chorion, or between the chorion and decidua, and evacuated during the advanced stage of pregnancy, or some time before the commencement of labour. In rare instances, the fluid may be actually the liquor amnii. Dr. BURNS remarks, that he has known cases where a considerable discharge of water has taken place after fright or exertion, with subsidence of the abdominal tumour, a feeling of slackness, and irregular pains, and yet the woman has gone to the full time. Other writers have made the same observation. Dr. DAVIS mentions these discharges, especially when they occur "in dribbling quantities weeks and months before labour," as indicative of great consequent danger. But in this other authors do not quite agree with him. The source of the fluid can be inferred only from the quantity and the recurrence of the discharge, and the effect produced upon the

abdominal tumour. If the discharge be great, sudden, and affecting the tumour, it may be referred to the escape of the liquor amnii. If it be gradual, small in quantity, and does not affect the abdominal tumour, it may proceed from the other sources pointed out.

14. The *treatment* consists in keeping the patient dry, clean, and perfectly quiet. An anodyne may be given as circumstances may suggest a recourse to it, and the bowels kept gently open by cooling aperients. Injections *per vaginam*, similar to those advised for *leucorrhœa*, have been recommended, but they are of doubtful efficacy; all perturbations, whether mental, physical, or medical, being much more injurious than beneficial.

15. vi. DROPSY OF THE AMNION.—*See art. Dropsy*, § 113, *et seq.*

16. vii. RHEUMATISM AND SPASM OF THE UTERUS have been described chiefly by German and French pathologists. Rheumatism may attack the uterus, as well as other fibrous structures, although much less frequently than those of more superficial or external parts. It is characterized by severe pain, increased on motion and the contraction of the abdominal muscles; by augmented sensibility and tenderness; and by symptomatic fever and restlessness.—*a.* It is caused by cold, currents of cold air, and the usual causes of rheumatism acting upon a rheumatic diathesis. VELTEN states that it was observed during an epidemic of rheumatism; and WIGAND, JOERG, and others, that it was caused by the projection of the clothes, during advanced pregnancy, by the enlarged abdomen, producing exposure of the lower part of the body. It may occur at any period of gestation, but is much more frequent in the latter months. The slighter states of it are very probably, as Dr. CHURCHILL suggests, what have commonly been called "false pains."

17. *b. Symptoms*.—The milder attacks consist chiefly of shooting pains in the region of the uterus, occurring at intervals, and either limited to a small space, or affecting the organ more generally. The severer attacks occur often suddenly, and without any apparent cause; are attended by violent pain in the region of the uterus, the duration and the character of the suffering distinguishing them from the commencement of labour, even although there may be distinct contractions of the uterus, and slight dilatation of the os uteri. In the milder forms there is little or no constitutional disturbance; but the more severe are attended by quickened pulse, hot skin, sleeplessness, and restlessness. Rheumatism of the uterus is generally accompanied with spasm, or irregular contraction of the organ, which is sometimes extended to the lower limbs. The irritation is occasionally, also, propagated to the bladder, causing frequent and painful micturition, and to the bowels, occasioning colic, tenesmus, or diarrhœa. "The motions of the child are a source of great torment, owing to the increased sensibility of the womb; and from some sympathy with the mother, it not infrequently happens that these motions are peculiarly lively."

18. When the affection occurs during parturition, WIGAND, DEZEIMERIS, and CHURCHILL state that the natural pains are arrested, or become tedious, ineffective, sudden or interrupted, and more distressing than usual. The pa-

tient is hot, thirsty, and irritable or restless; the pulse being quick, and either full, soft, and undulating, or small and hard. The uterus is very tender, the weight of the bedclothes occasioning much pain; and the cervix and os uteri are often tender and painful on examination. If the case be left to itself, the pains become weaker, or suspended for hours. If the patient falls into perspiration and sleep, the natural pains recur, and delivery is favourably terminated.—(CHURCHILL.)

19. *c.* The *diagnosis* between rheumatism and inflammation of the uterus consists in the more limited and continued pain of inflammation, and in the more sudden, spasmodic, and paroxysmal character of the pain of rheumatism. It is not improbable that some cases, occurring in the eighth or ninth months of pregnancy, are merely spasmodic paroxysms, or irregular contractions of the body of the organ, and not truly rheumatism affecting its structure.

20. *d.* The *prognosis* is generally favourable, when the patient comes early under treatment; but if she be neglected, abortion or premature labour may follow the continuance of the attack, and the repeated contractions of the uterus and spasm attending the complaint. Slight dilatation of the os uteri usually attends the period of severe suffering; but this part regains its natural state upon the subsidence of the attack. JOERG states that the child is less frequently injured by rheumatism than by inflammation of the uterus.

21. *e.* The *treatment* consists of venesection varying in amount from six to twelve or sixteen ounces, when the patient is young, strong or plethoric, and when there is fever with a hard or full pulse; of sedatives and diaphoretics; and of anodyne enemata. Opium with ipecacuanha may be given at bedtime, or Dover's powder; and, after opening the bowels by a suitable aperient, an emollient and anodyne clyster should be administered. An opium or belladonna plaster may be applied over the abdomen or loins; and diaphoretics should be administered at intervals, conjoined with an opiate or some other narcotic. The warm embrocation containing spirits of turpentine, with a considerable proportion of the wine or tincture of opium, may be applied over the abdomen. If the attack occur at the commencement of parturition, this embrocation, without the opium, will generally prove efficacious. The bowels ought to be kept quietly open, so as to prevent fecal accumulations; and the diet duly regulated.

22. viii. INFLAMMATION OF THE PREGNANT UTERUS.—Inflammations of the womb in the unimpregnated state, and after delivery, are described in the articles UTERUS and PUERPERAL DISEASES. I have merely to notice such peculiarities as hysteritis presents during gestation. As may be anticipated from the physiological conditions of the uterus, inflammation attacks the impregnated organ more frequently than the unimpregnated, although less so than after delivery.—*a.* It is caused by exposures to cold, by injury, by contusions of the trunk, by the abuse of spirituous liquors, and by the extension of inflammation from adjoining parts. Hysteritis during pregnancy and after delivery, as observed in the metropolis, is chiefly caused by the abuse of spirituous liquors, more espe-

cially of gin. It is said to be most frequently observed in the sanguine and irritable temperaments, and scrofulous diathesis, and seldom to occupy the entire uterus, unless in the very early months. In the latter months of pregnancy, it is more limited, affecting chiefly the lower portions or cervix. At earlier periods it is commonly seated in that part to which the placenta is attached. The inflammation is seated in the muscular structure, but the peritoneal coat may also be implicated; in which case partial or limited adhesions may form between the fundus or body of the uterus and adjoining parts, as I have observed in several instances.

23. *b.* The *symptoms* are a severe, constant, or aching pain in some part of the abdominal tumour, increased upon pressure, upon sudden motion, walking or descending stairs quickly, and by the movements of the child. It often extends to the back and groins. Sometimes dysuria, or a frequent desire to pass urine, or tenesmus, or pain on going to stool, is complained of. More or less sympathetic disturbance is produced, especially heat of skin, quickened pulse, thirst, nausea, or vomiting. "If the disease be very limited, the child may escape injury, and gestation be completed; but if more extended, the fœtus will probably perish in utero, or be prematurely expelled." Unless the disease be completely removed, and the womb restored to a healthy condition, the consequences during parturition may be very serious. Dr. GASON informed Dr. CHURCHILL that, in three cases of inflammation of the womb during pregnancy, rupture took place during labour in the exact spot previously diseased. Dr. E. MURPHY states that most instances of rupture of the uterus may be traced to lesions either previously existing or produced by inflammation. The wife of a respectable tradesman, for whose family I was often consulted, complained of hysteritis at an advanced period of pregnancy. She had had several children, and her constitution was much injured by gin-drinking. She sunk almost instantly upon delivery from sudden and profuse flooding. Inspection of the body was not allowed.

24. *c.* Hysteritis during pregnancy may terminate, 1st. In resolution, the patient going her full time and being safely delivered; 2d. In effusion of lymph and the firm adhesion of the placenta to the uterus; 3d. In softening of the structure of the organ, favouring rupture or dangerous or fatal hemorrhage; 4th. In the production of an abscess or small abscesses in the inflamed portion of the uterine parietes; and, 5th. Even in gangrene, as described chiefly by the German writers on diseases of the uterus.

25. *d.* The *prognosis*, as shown by these terminations, ought to be guarded, especially when the disease occurs in females addicted to the use of spirits, to whom it is frequently fatal in one of the ways now indicated.

26. *e.* The *treatment* should depend upon the habit of body, strength, and habits of the patient, and upon the extent and severity of the local symptoms and of the constitutional affection. Although the local suffering is generally less severe than in rheumatism of the womb, the constitutional disturbance is greater, and a more decided and prompt treatment is often required. In other respects the treatment is much the same as recommended for rheuma-

tism of the organ. Local vascular depletions are generally beneficial; and calomel, camphor, and opium are also of service. In other respects the treatment should be the same as advised for inflammation of the womb in the other articles comprising it. (*See* UTERUS and PUERPERAL FEVERS.)

27. III. AFFECTIONS OCCURRING SYMPATHETICALLY DURING PREGNANCY.—The general systems and the more remote organs may experience more or less disorder in the course of pregnancy, arising either directly from the altered state of the uterus; or indirectly, as from fecal accumulations in the large bowels, that are apt to form during the earlier periods of gestation.

—i. THE DIGESTIVE ORGANS often experience more or less disorder. The slighter or less important of them may be only mentioned.—A. TOOTHACHE is frequently complained of, but is owing to the common causes of the affection; for it is not usually felt when these causes have not existed before conception; pregnancy, either directly or indirectly, aggravating merely a pre-existing evil. The bowels generally require moderate but repeated doses of stomachic aperients, and afterward anodynes, locally and internally, preparations of iron, narcotics, and antispasmodics, &c. The question as to the propriety of extraction, or of other painful operations for this complaint during pregnancy, may be considered as set at rest by having recourse to ether or chloroform inhalation.

28. B. SALIVATION is sometimes troublesome; but it is rarely of great importance. It will generally be moderated or removed by a judicious use of stomachic or cooling aperients, by cooling and astringent gargles, and attention to the states of the gums and teeth. Rinsing the mouth often with tar-water, or with mucilaginous fluids containing creasote or spirits of turpentine, will generally be useful, and also benefit the teeth and gums. *Capricious or morbid appetite* is not infrequent during pregnancy; but this topic suggests nothing of any importance in addition to what I have stated in the article APPETITE. If, however, carried to an extreme, it may, as well as frights and violent mental perturbations, affect the development of the fœtus.

29. C. NAUSEA AND VOMITING generally occur at some period of gestation—most frequently from the third to the sixth week after conception, although occasionally only a few days after this act; and sometimes not until the seventh or eighth month of gestation. At the earlier periods these symptoms are merely sympathetic. In the latter months they may, in some measure, be caused by the pressure of the uterus.—a. The patient usually finds her stomach uncomfortable on rising in the morning, and the discomfort soon amounts to nausea or vomiting. Whether the stomach be evacuated or not, the nausea ceases after a few minutes or within an hour; and, after some delay, breakfast is taken with the usual or good appetite, and without subsequent inconvenience. These attacks are renewed every morning for six weeks or two months, when they gradually subside. In some cases, vomiting does not occur until a full meal is taken. It may also take place at any time of the day, or in the evening. Instead of gradually ceasing about the third or fourth month, or after quickening,

it occasionally continues during pregnancy, causing great distress and some risk. If carried beyond certain limits, it may occasion miscarriage. When vomiting follows a meal the constitution of the patient languishes from a want of due nourishment as well as from the continued irritation, the patient even sinking from inanition or exhaustion. Several instances of this issue are recorded in the works referred to in the *bibliography*. When the progress of pregnancy is arrested by the death of the fœtus, then the vomiting ceases spontaneously. Instances have occurred of an internal organ, the uterus, stomach, &c., having been ruptured by the violence of the vomiting. The matters thrown off the stomach may be thin, watery, glairy, colourless; or consist partly of bile, or of blood. In severe cases they are greenish or blackish, owing to an admixture of bile or an exudation of blood. The vomiting is generally attended by tenderness at the epigastrium, prostration of strength, a weak, small, quick pulse, constipated bowels, and sometimes a loaded tongue.

30. b. *The causes of the serious cases of vomiting during pregnancy* have not been duly investigated even by those physicians who believe themselves the sole depositories of the knowledge of female maladies. Writers on these maladies have not even shown whether or not this vomiting may not result from disease of the uterus or of the ovum; and they have not always attended to the existence of disease of the liver and biliary apparatus, or of the duodenum and pancreas, or of the stomach itself; or to the presence of scybala, or of irritating substances locked up in the cells of the colon. They even furnish no information as to the states of the kidneys or of the ovaria—so little has a division of labour hitherto tended to advance this department of medical science. Cases, however, have occurred when dangerous or fatal vomiting has been caused chiefly by lesions seated as just stated, or by retained irritating matters, pregnancy merely developing and perpetuating a sympathetic disease, which in most of its morbid relations had previously existed, but had been latent, until it became aggravated or excited by the change in the uterine organs.

31. c. *The diagnosis of vomiting* should not be overlooked, with reference to its dependence or non-dependence on pregnancy. The chief circumstances indicative of its dependence on this cause are its occurrence and daily recurrence in connexion with the disappearance of the catamenia, the speedy return of appetite and of the appearance of good health in the intervals, the changes apparent in the nipple, areolæ, and in the mammaræ, and the absence of any sign of disease of the stomach itself, or of any other organ.

32. d. *Treatment*.—In slight cases, and especially during the early months, little or no treatment is necessary: time will remove the disorder. But the bowels should always be kept gently open, as any accumulation in the large bowels aggravates the complaint. If nausea be distressing, and unaccompanied with vomiting, an ipecacuanha emetic will often be of use at an early period of gestation; and, after having evacuated the bowels, the infusion of calumba or of cheyrita may be given. If the patient

be very robust or plethoric, a moderate bleeding will be serviceable at the commencement; but at a later period, or when she is reduced by the duration of the disorder, it is inappropriate. Gentle stomachic or cooling aperients, suited to the circumstances of the case, are generally beneficial. The most useful are, the confection of senna with magnesia, [lemon-juice], the infusions of calumba and of senna with tartrate of potash, with an aromatic spirit; the compound infusion of roses with sulphate of magnesia, a little dilute sulphuric acid, and tincture of orange-peel; and, if the bowels are not much confined and the sickness more urgent, from a scruple to half a drachm of sulphate of magnesia with fifteen grains or a scruple of magnesia, and four or five drops of tincture of opium, in spear-mint water, taken once, twice, or thrice daily. In several cases, the nausea or the vomiting is aggravated or perpetuated by acidity, especially if flatulency is complained of. The infusion of calumba, with magnesia and ammonia, is then very beneficial. Small morsels of ice are sometimes of use.

33. In more severe cases, the application of embrocations over the stomach, or mustard poultices, or terebinthinate epithems, or blisters may be resorted to. When the matters thrown off are acid, acrid, or attended by flatulent eructations, powdered charcoal, magnesia, ammonia, or other alkalies are severally of use. The hydrocyanic acid may also be given; or creasote, either in pills or in mucilaginous mixtures. The several preparations of opium or of morphia, conjoined with other medicines—either those already enumerated, or warm aromatics and spices, as capsicum, aromatic confection, &c.—are sometimes of service; and embrocations or epithems with laudanum over the stomach afford relief in the more urgent circumstances of the case. During the use of these means, the bowels ought to be preserved in an open state, either by such aperients as are most likely to be retained on the stomach, or by laxative and anodyne clysters. When the bowels are sufficiently evacuated, starch enemata, containing sirup of poppies or the compound tincture of camphor, will then be of service. In all circumstances the horizontal posture ought to be adopted, and strict attention paid to diet, the patient's desire for articles of food being indulged, if there be no reason to the contrary. When all other means fail, and the case admits of the measure, the induction of premature labour may be contemplated, or even attempted.*

34. *D. HEARTBURN, PYROSIS, SPASMODIC and COLICKY PAINS* are often complained of during pregnancy, and are severally relieved by antacids, conjoined with tonics, antispasmodics, and anodynes, and by a due promotion of the intestinal secretions and excretions, as just advised for *nausea or vomiting*, or as they are more fully directed in the articles *INDIGESTION, COLIC, PYROSIS, and STOMACH*.

35. *E. CONSTIPATION OF THE BOWELS* is very common during pregnancy, and always aggravates the disorders of the stomach, which have been noticed above.—*a.* It is caused in some instances by the pressure of the gravid uterus

on the rectum and sigmoid flexure of the colon; by impaired action of the bowels in others, owing to vital and vascular determination to the uterus; and not infrequently it is increased by the impaction of hardened feces in the cells of the colon. Fæcal accumulations in the cells may exist, and may even endure for weeks or months without the constipation being remarkable; and in this way many of the disorders of pregnancy may be produced or aggravated; not merely those already mentioned, but also headaches, restlessness, watchfulness, colicky pains in the abdomen; weight, flatulence, and distention in this cavity; hemorrhoids, and sometimes diarrhoea or tenesmus. If these ailments continue or increase, owing to the retention of fæcal collections, inflammation of the bowels or dysentery, or abortion may supervene. If constipation, and the collections of fæcal matters in the bowels consequent upon it take place during the latter months of gestation, or be retained until the period of delivery, the diseases incidental to that period are very readily produced.

36. *b.* The treatment consists of the occasional recourse to the aperients already mentioned; to rhubarb and magnesia; to the infusions of gentian and senna, with such adjuncts as may suggest themselves; to confection of senna with sulphur and magnesia; to castor oil or olive oil taken in small and frequent doses: to the compound rhubarb pill, with extract of henbane and Castile soap, and sometimes, also, a little ipecacuanha; to emollient and laxative enemata; or to soap or oleaginous clysters. In obstinate cases more active means may be employed, with due reference to the situation of the patient; and for these I must refer the reader to the article *CONSTIPATION and COSTIVENESS*.

37. *F. DIARRHOEA* is often met with during pregnancy as a consequence of improper food, &c., and of neglect of the bowels, or of constipation. It may be kept up by the presence of hardened feces in the cells of the colon.—*a.* It may occur at any period of pregnancy, and may arise from cold, from mental perturbation, from the state of the secretions and excretions, and without any assignable cause. The acidity consequent upon imperfect digestion often occasions it. Very recently I was consulted respecting a case which resisted absorbents, astringents, tonics, opiates, &c. The patient accidentally mentioned her addiction to the use of immoderate quantities of sugar. This substance was interdicted, unless in small quantity; and within three or four days afterward the same medicines as were previously taken without benefit removed the complaint.

38. *b.* The treatment consists of small doses of hydrarg. cum creta with Dover's powder; or of small quantities of rhubarb with ipecacuanha and dried sub-carbonate of soda; of ipecacuanha with the extract of hop, or with the compound soap pill; of cretaceous mixture with compound tincture of camphor, or tincture of hop; and of flannel clothing worn next the skin, and suitable diet. (*See, also, art. DIARRHOEA.*)

39. *G. JAUNDICE* is not of frequent occurrence during pregnancy. It may appear at any period of gestation, but more frequently during the latter months, and in females who have had

[* We have known two cases where it was necessary to resort to this measure, and where it proved successful, saving, beyond doubt, the life of the patient.]

several children, or are advancing in life. It generally continues until after delivery. It may be caused by the pressure of the gravid uterus, but more frequently by some one of the several pathological conditions assigned in the article JAUNDICE. The symptoms vary with these conditions; and the treatment should have strict reference to them, as well as to the stage of pregnancy and other peculiarities of the case. Although laxatives, or even cholagogue purgatives, may be cautiously employed and repeated more or less frequently, yet active cathartic or other heroic measures should not be prescribed. If nausea or vomiting occur, or diarrhœa, the remedies advised above for these may be employed; and the more urgent symptoms, as pain and spasm, should be palliated by means of narcotics, &c. If the symptoms indicate active congestion or inflammation of the liver, bleeding and other antiphlogistic means must be adopted.

40. ii. VARIOUS DISORDERS OF THE HEART AND RESPIRATORY ORGANS sometimes occur during pregnancy. These are apt to appear in hysterical or nervous females, and during a first pregnancy.—A. FAINTNESS, FAINTING, or full syncope, is most apt to occur at the period of quickening, but it may take place at any period, or may recur occasionally or frequently. Delicate and weak females are most liable to it. "Towards the end of pregnancy, fainting is regarded with much suspicion, not so much for the immediate consequences as for its effect upon convalescence after parturition." (CHURCHILL.) It may prove a serious affection if it depend upon passive dilatation of any of the cavities or orifices, or other organic disease of the heart: lesions which consultation will detect.

41. B. PALPITATIONS OF THE HEART are often connected with faintness or syncope, either of these preceding or following the other; and both affections often depending upon the pressure of the gravid uterus upon the digestive organs, and of these latter upon the diaphragm. The embarrassment thus occasioned to the circulation through the heart is often increased by collections of flatus in the stomach, and even in the œsophagus, as well as in other parts of the digestive canal, these collections being often retained by spasm of adjoining parts of the canal. These symptomatic affections are usually caused, developed, or aggravated by mental emotions and perturbations, by errors in diet, by startling noises or occurrences, by disordered states of the stomach and bowels, and by a susceptible and hysterical diathesis. The treatment is nearly the same for both affections. During the paroxysm of faintness the patient should assume the horizontal position; during that of palpitation, the sitting. Antispasmodics and stimulants are beneficial for both, especially those which are prescribed for HYSTERIA. Between the attacks, tonics, restoratives, quinine or cinchona, the bitter infusions or decoctions, stomachic aperients, with due attention to diet and regimen, will generally prevent a return of disorder.

42. C. COUGH AND DYSPNŒA may occur in the early months from sympathy. Either of these may then assume an hysterical character, the cough depending chiefly on sympathetic irritation of the larynx or trachea, and dyspnœa

arising either from the same cause or from affection of the bronchi or respiratory nerves. In these circumstances, both cough and dyspnœa are nervous, spasmodic, or hysterical. But in the advanced stage of gestation, both affections may be caused and continued by the pressure of the gravid uterus, and aggravated by flatulence, indigestion, and costiveness. The diagnosis should, however, be established by means of the stethoscope and percussion, and by an attentive consideration of the several rational symptoms, lest these symptoms proceed from pneumonia, bronchitis, tubercular disease, or some other malady that has supervened or been developed in the course of pregnancy. When these affections are merely nervous and sympathetic, the treatment should be antispasmodic and anodyne. The bowels ought to be freely evacuated, and kept duly open; and acidity of stomach and flatulence prevented by means of tonics, antacids, and carminatives, as already advised, the diet and regimen being duly regulated. If these affections occur in full and robust females, they may be connected with pulmonary congestion, and then blood-letting is requisite. When the cough is severe, the use of narcotics and anodynes is of service, in order to moderate it and to diminish the risk to the fetus. If it be attended by dyspnœa, pain, or fever, or by adhesive or glairy expectoration, blood-letting is also proper, with antimonial and other diaphoretics.

43. D. HÆMORRHOYSIS may occur with or without either or both of the affections just noticed. It is not often observed, for pregnancy more frequently removes than induces this complaint. When, therefore, it is met with during pregnancy, it should be viewed as a most serious evil, and the means advised for hemorrhages promptly employed, according to the state of the case, especially blood-letting, cupping over the back or thorax, acetate of lead with opium, digitalis, acids, antimonial diaphoretics, turpentine epithems applied over the chest, &c.

44. iii. DISORDERS OF THE NERVOUS SYSTEM DURING PREGNANCY.—A. HEADACHES are frequently experienced during utero-gestation, and chiefly by two classes of constitution: 1st, by the delicate, nervous, hysterical, and those deficient in blood; 2d, by the plethoric and robust. In the earlier months the nervous character of headache is most pronounced, in the later months the congestive or plethoric. This latter form is often connected with impeded circulation through the heart and lungs, in consequence of the pressure of the gravid uterus, and in this case more particularly it is aggravated by indigestion, flatulency, and costiveness. The nervous form of headache is often limited, as to the vertex—the *clavus hystericus*—or to one side—*hemerania*. It is oftener felt in paroxysms than without intermissions; and it is unattended by flushings of the face, heat of scalp, or injection of the conjunctivæ. Congestive or plethoric headache is attended by flushing, increased heat of scalp, injected eyes, a sense of throbbing, distention or fullness, by intolerance of light and sound, and it usually commences in the forehead, and extends equally to both sides; it is also continued and sometimes increased by a meal; while the nervous variety is relieved by a meal and by stimuli.

45. The *treatment* is different in either case. The *nervous form* requires stimulants, antispasmodics, and tonics; as ammonia, camphor, valerian, cascarrilla, &c.; the *congestive*, moderate blood-letting, general, or local, according to circumstances, purgatives, diaphoretics, &c. In all cases, the diet and regimen ought to be suited to the form of headache which is complained of, and the uses of all stimulating or restorative beverages either allowed or disallowed accordingly.

46. *B. SLEEPLESSNESS* is sometimes a distressing complaint of nervous, hysterical, and delicate females, especially as pregnancy advances. It is most liable to affect those who shut themselves in-doors, and deprive themselves of exercise in the open air, and who sleep in too warm and ill-ventilated chambers, or with too much bed-clothes. It is often attended by restlessness, by anxiety respecting trifling matters, and ultimately by despondency, and even by hypochondriasis. It is also intimately allied, and often associated with, *nervous headaches*. It is much more rarely associated with plethoric headache.

47. *Treatment*.—Besides the means already advised for *nervous* and hysterical headaches (§ 45), I have seen decided benefit result from a draught at bedtime, containing a drachm of the tincture of hop, with five or six of the carbonate of ammonia, or from twelve to twenty grains of the carbonate of potash, or soda, or magnesia. When the sleeplessness is attended by indications of *plethora* and active determination of blood to the head, and with the usual indications of *congestive* headache (§ 44), then vascular depletions, purgatives, and other antiphlogistic means, and low diet, are required.

48. *C. DESPONDENCY AND HYPOCHONDRIASIS* are not infrequent in hysterical females, especially during a first pregnancy, and more especially in unmarried females. In married females, these moral affections are most commonly seen in the delicate constitution and hysterical diathesis, and are often attributable to no other exciting cause than the contemplation of the future pains and contingencies of child-birth, or the private contrarieties and anxieties of married life. In the unmarried, numerous and painful reflections serve to develop these mental conditions, and even to carry them on to a state verging on insanity, and subversive of due control. In many such cases, the sentiments and emotions excite the cerebral circulation, and this in its turn augments the despondency, or carries it beyond the limits of sane judgment and conduct.

49. The *treatment* depends upon the peculiar circumstances, moral and physical, of each case. If the despondency proceed from fears of the dangers of child-birth—a cause which seldom exists alone—a true statement of the small amount of that risk will generally allay such fears; for there are very few females, however inexperienced, who indulge such fears after knowing the truth, especially when their hopes are excited and promoted by affection. If the disorder of the mind is truly nervous or hysterical, agreeable society, change of scene and of air, gentle exercise, mental occupation of a pleasant kind, healthy air, and restorative treatment will generally remove it. If the temperature of the scalp, the appearance of the eyes

and countenance, and the action of the carotids, indicate increased determination of blood to the head, then moderate bleeding, especially if the patient be strong or plethoric, cold sponging the head frequently, mild purgatives, derivatives, warm clothing on the lower parts of the body, and light, digestible food, will be requisite, with such other means as the peculiarities of the case may suggest.

50. *D. CONVULSIONS* during pregnancy assume one or other of these forms—the *hysterical*, the *epileptic*, or the *apoplectic*. The first of these is confined to utero-gestation, and is much more frequent during the early months than at an advanced stage. It is chiefly dependent upon the vital excitement and vascular determination to the sexual organs, and affects chiefly the weak, delicate, and hysterical constitution. The character and treatment are in all respects the same as described in the article *HYSTERIA*. *Epileptic convulsions* are the most frequent forms of convulsions at an advanced period of pregnancy, and the *apoplectic* during or after parturition. They are fully discussed in the articles *CONVULSION* (§ 27–88) and *EPILEPSY*.

51. *E. PAINFUL AFFECTIONS OF THE MAMMÆ*—*Mastodynia*—often commence during pregnancy, with pricking or tingling sensations in them, followed by shooting pains, with slight soreness of the nipples and increased size of the mammæ themselves, and especially of the glandular structure. The pains may be either of a neuralgic character, and owing to sympathy with the increased excitement of the uterus, or altogether consequent upon the stretching of the fibrous envelope by increased development of the glandular structure. In the latter months the pain is often dependent upon active vascular determination, which may go on to inflammation and abscess.

52. The *treatment* consists of fomentations, or frictions with oleaginous and anodyne liniments, or emollient poultices. In many cases no treatment is necessary. In the severer attacks, if these means fail, anodynes, cooling aperients, and antimonial diaphoretics may be prescribed: blood-letting, general or local, is seldom required, unless great tension, enlargement, or increased heat exist, and then the application of a number of leeches, or even venesection, should not be delayed, especially in plethoric females, lest active determination and congestion should go on to inflammation and its usual consequence, abscess. (*See art. MAMMÆ.*)

53. *F. VARIOUS OTHER SYMPTOMATIC DISORDERS, AND EVEN STRUCTURAL DISEASES*, occasionally supervene in the course of pregnancy, owing either to the sympathy existing between the parts affected or to the pressure of the gravid uterus. To the former of these states anomalous affections of the organs of sense, especially of sight and hearing, altered sensibility of various parts, occasional spasms, slight attacks of singultus, eccentricities of conduct or of sentiment, &c., are chiefly owing. To the latter cause, hemorrhoids, incontinence, or retention of urine, varicose veins, cramps or spasms of the lower limbs, œdema, anasarca, ascites, &c., are chiefly to be referred, and are noticed in their relations to the pregnant state in the articles in which these several maladies are described.

54. III. INFLUENCE OF PREGNANCY UPON THE COURSE, TERMINATION, AND TREATMENT OF CHRONIC OR PRE-EXISTENT DISEASES.—A. Various pre-existent maladies have no influence in preventing conception; a very few have even the effect of favouring the act, especially tubercular and scrofulous diseases, when not very far advanced; glandular enlargements, slight hemorrhages, hysteria, &c. Several of these maladies, indeed most of them, and especially those now named, are either altogether arrested in their progress, or impeded or rendered latent, owing to the vital determination to, and increased vascular action developed in, the sexual organs, and to the salutary influence exerted thereby throughout the economy. Pulmonary affections, especially tubercles in the lungs and hæmoptysis, are generally arrested, if not too far advanced; the pulmonary symptoms often almost disappearing during the continuance of pregnancy; but, soon after parturition, they often re-appear with much greater severity, and sometimes with various associations. When pregnancy occurs at an advanced stage of phthisis, the disease is only partially abated, or rendered somewhat more latent; and in this case, not only is the child born with tubercles already formed, as I have ascertained by inspection in three instances, but the mother sinks in a short time after delivery, with remarkable increase of the pulmonary symptoms, either granular degeneration of the kidneys, with anasarca, ascites, &c., or delirium, or some other complication, besides the more common one of colliquative diarrhœa, rapidly appearing, and accelerating a fatal issue. When the pulmonary symptoms are only slight, the tubercles not having gone on to softening, then not only may pregnancy arrest the farther progress of the malady, but also may subsequent lactation, if duly managed so as not to impair the strength, exert a similar preservative influence, until pregnancy again recurs; and thus the disease, which had appeared before marriage, and had even been attended by hæmoptysis, be kept at bay for several pregnancies, or until the cessation of child-bearing, when it generally reappears and runs its usual course. I have seen a lady who had experienced an attack of hæmoptysis before marriage, have nine children, and enjoyed tolerably good health, and, having ceased to become pregnant, die of consumption two or three years after the birth of her last child.

55. Although pregnancy thus arrests the progress of chronic maladies in most instances, yet, if these maladies are of so severe a character as not to be removed altogether, as some of them are, by this state, and by the changes induced by it in the frame, they may be very remarkably aggravated after parturition, or during the last stage of gestation. Epileptic seizures may be rendered fewer or slighter during pregnancy, especially in the earlier periods; but they may be more severe at an advanced period, or even fatal during parturition. Paralytic affections, even hemiplegia or paraplegia, may be complete, and yet the patient become pregnant, bear a child at the usual period, and even become pregnant several times; but there is an increased risk of apoplectic seizures or convulsions during advanced pregnancy and during parturition. Pregnancy has generally a beneficial effect upon hysteria, leucorrhœa, and

dysmenorrhœa, but there are not infrequent exceptions; and in several other diseases so many circumstances tend to vary the results, provided pregnancy actually occur in their course, that nothing precise can be advanced respecting them. During chlorosis and anæmia, particularly the former, pregnancy may not take place; but if it occur in either, a very beneficial change generally results.

56. B. *As to the management or treatment of pregnancy thus occurring during chronic maladies* but little can be said. The suggestions of good sense, guided by pathological knowledge, will point out what ought to be done and what avoided, in the different and ever-varying circumstances in which medical advice will be required. In most instances, officious interference will be more prejudicial than beneficial; and the operations of nature, aided by suitable diet, pure, temperate, and dry air, and a gentle promotion of the several vital and excreting functions, will do more than any plan that can be laid down. Heroic or even active remedies should be avoided. They are out of place in these cases, and are only employed by charlatans and pretenders in and out of the pale of the profession. In these, as well as in other circumstances, it is not only the probable good which may be done, but the possible evil also which may follow, that should engage our minds and guide our determinations as to the use of any remedy and the adoption of a particular plan of cure.

57. IV. INFLUENCE EXERTED BY PREGNANCY ON THE PRODUCTION, COURSE, AND TREATMENT OF ACUTE MALADIES.—A. During pregnancy, the increased manifestations of vital action throughout the frame tend to ward off many of the slighter causes of disease, and even others of a more energetic kind, which would have, in other circumstances, been productive of disease, fail of causing it, or cause it in a less degree, during this state. Various epidemics have been observed to affect a smaller proportion of pregnant women than of others, and even endemic diseases have been less frequent among them. Epidemic diseases of a malignant character, or those which often assume a malignant form, as smallpox, scarlet fever, measles, erysipelas, typhous and adynamic fevers, are liable to become not only malignant, but rapidly fatal when they attack pregnant females, although this class of females are less predisposed to them than others. If these maladies appear at an early stage of gestation, abortion is likely to occur, and the danger is thereby increased; if they appear at an advanced period, or shortly before parturition, premature labour often takes place, and a fatal issue very frequently results soon after delivery. Other acute diseases, as inflammations of any of the viscera, although occurring less frequently in pregnant than in other females, are also attended by much increased risk, not only of abortion, but even of dissolution; although the danger is, upon the whole, not so great from these attacks as from exanthematous and malignant fevers. HIPPOCRATES (*Aphorism.*, L. v., 30) says, that "pregnant females seized with an acute disease never recover." This inference, however, is too general, for recoveries take place, in some instances, from most of the acute maladies which have been now enumerated, but

the danger is always great, even in cases of inflammation of the respiratory organs or pleura; and it is not less so, if not even greater, when inflammation of other important or vital organs takes place during pregnancy.

58. *B. The treatment of acute maladies attacking pregnant females* should be appropriate to the nature of the disease, to the pathological conditions of the case, to the progress it has made, and to the circumstances of the patient and the stage of her pregnancy. In most epidemic, or exanthematous, or febrile maladies which are not truly inflammatory, violent or perturbing remedies should be avoided; vascular depletions, the promotion of the abdominal and cutaneous excretions, and due support of the vital powers being severally prescribed, as the nature of the disease and the circumstances of the case may require. In every instance the malady should be carefully watched, remedies cautiously administered, and the various offices of the nurse assiduously performed. The numerous details which a due discussion of this subject might involve are beyond my limits. They will readily suggest themselves in practice to the observing physician, who will act in all things appropriately to the peculiar circumstances both of the disease and of the patient.

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PROSTATE GLAND.—DISEASES OF.—This gland is seldom diseased in young persons; but it is much more frequently affected after puberty, and with advancing age. It is very often diseased in old persons; and generally at this period of life its diseases are associated with those of the bladder, often also with those of the kidneys and urethra; and sometimes gravel or urinary calculi are superadded. The diseases of this gland are, 1st. Inflammatory; and, 2d. Organic or structural; certain of these latter being independent of inflammatory action, and frequently associated with other diseases of the urinary organs.

INFLAMMATIONS OF THE PROSTATE GLAND.—**SYNON.** PROSTATITIS; *Inflammation de la prostate*, *Prostatite*, Fr. *Entzündung der Vorstehdrüse*, Germ.

CLASSIF.—III. CLASS, I. ORDER. (Author in Preface.)

1. **DEFIN.**—*Pain and heat in the perinæum extending to the anus; frequent micturition, with a scalding sensation on voiding urine; tenesmus; and sensible enlargement and heat of the gland upon examination per rectum, with symptomatic feer, and sometimes retention of urine.*

2. Inflammation of this gland may be either acute or chronic, and each may occur primarily; but the chronic is often consequent upon the acute, owing as frequently to the constitution and age of the patient, and the complications of the disease, as to any fault in the treatment. Either of these states of the disease may arise from causes common to both, and be followed by nearly the same, or the very same organic lesions. Prostatitis, whether acute or chronic, may be the primary malady, and occasion diseases of other associated parts; or it may be secondary, or consecutive of these diseases, or of urinary deposits or calculi.

3. **THE CAUSES OF PROSTATITIS** are chiefly premature or excessive excitement of the sex-

ual organs, especially manustupration; riding much on horseback or in a carriage; sitting habitually on warm cushions, or accidentally on wet or damp cushions; a frequent or habitual neglect of due evacuations of the urine or of the bowels; the abuse of such purgatives as irritate the rectum, as calomel, blue-pill, aloetic preparations, &c.; frequent costiveness or constipation; dysenteric attacks; inflammations of the urethra, especially gonorrhœa, gleet, &c.; strictures of the urethra; the use of various substances recommended for the cure of gonorrhœa or gleets, especially irritating or astringent injections, and stimulating gum-resins and balsams; nutritious and highly-seasoned viands; excessive use of spirituous and vinous liquors, or of strong coffee; aphrodisiac substances, especially cantharides taken internally or applied externally; exposure of the lower extremities to cold or wet, especially if the individual be of the gouty, gravelly, or rheumatic diathesis; catarrh or inflammation of the urinary bladder; morbid secretions from diseased kidneys; the irritation or pressure of calculi in the bladder; the irritation of worms in the rectum; and injuries sustained in or near the perinæum and anus. Either of these causes may develop the disease, especially during advancing age, and in persons who are addicted to venereal excesses.

4 ii. SYMPTOMS.—*A. Acute Prostatitis* is attended by increasing heat and pain in the perinæum that extend to the anus. Micturition is frequent, and accompanied with pain and scalding upon passing the urine, these sensations being increased "as the *acceleratores urina* contract to expel the last drops of urine." Mr. Coulson accurately observes, that evacuations from the bowels cause great uneasiness; and there often remains a sensation as if the rectum was not completely emptied, giving rise to distressing tenesmus. Upon making an examination *per rectum*, "the prostate is felt as a smooth, round, and hard body, projecting downward on the bowel," which feels hot; and pressure on the gland is exceedingly painful. If a catheter or sound be attempted to be introduced, it passes without difficulty as far as the membranous part of the urethra; but its passage onward is attended by acute pain and severe spasmodic contractions. The above symptoms are aggravated by sitting, standing, or riding on horseback or in a carriage, or by exercise or exertion of any kind, and by the use of heating or stimulating beverages.

5. When resolution takes place, the above symptoms subside; but if the inflammatory action continues unchecked, the inflammation extends to the neck of the bladder, or even farther, and, with the tumefaction of the gland, gives rise to *retention of urine*. In this case the febrile symptoms are remarkably exacerbated; and if retention be prolonged, delirium, followed by coma, owing to excrementitious plethora, may result, if the inflammation be not subdued or the bladder emptied.

6. When rigours occur, with increase of the febrile symptoms, quickened pulse, hot skin, and furred tongue, especially toward the evening; with a sense of fullness, tension, or throbbing in the perinæum; and with more frequent calls and increased difficulty of micturition, the existence of suppuration may be inferred. Mr.

Coulson states, that if the prostate be now examined through the rectum, it will no longer be found hard and resisting, but resembling a distended bladder. The examination, as well as the discharge of feces, causes great pain, and there is constant tenesmus with a sense of burning. The fibrous investment of the gland, softened by inflammation and distended by pus, sometimes exudes a creamy and sanguineous matter into the urethra, the rectum, or the bladder; and then the tumour subsides, the urethra becoming freer, the bladder emptying itself, and the symptoms abating. If the abscess opens into the urethra, the evacuation of urine is preceded or followed by a copious discharge of purulent matter by this passage. Mr. Coulson remarks, that in some cases more or less blood is mixed with the discharge, and that he has known a considerable hemorrhage to take place. After the last drops of urine are voided, there is a stinging pain which lasts for a few minutes, or for a longer period; and there is also a burning pain in the glans penis.

7. *B. Chronic inflammation of the prostate gland* is sometimes a consequence of the acute state of prostatitis, especially when the inflammatory action is only partially subdued and not entirely removed. It is occasionally, also, a reproduction of the morbid action in a milder and slower form, in consequence of the influence of one or more of the causes during or soon after the subsidence of the acute attack. The prolongation of the inflammation in a chronic form, after the acute symptoms are subdued, is often owing to the gouty or rheumatic, or serofulous diathesis, to gravelly or calculous formations, to the use of stimulating beverages, and to venereal indulgences. Mr. Coulson remarks, that sometimes, in feeble subjects, the antiphlogistic treatment stops the progress of the inflammation at a period of the disease when pus has already formed in the prostate, but has not effected its discharge. Infiltrating the cellular tissue connecting the lobes of the gland and surrounding parts, or contained in small abscesses, this purulent matter becomes more consistent by the absorption of its more fluid parts, and gives rise to cheese-like or tubercular formations, which excite slight attacks of inflammation, with increased deposition and bulk of the gland.

8. More frequently, however, chronic prostatitis commences primarily, and the gland assumes an enlarged, and sometimes an indurated state, owing to the absorption of the more fluid portions of the serum and lymph deposited by inflammatory action into the cells of the connecting cellular tissue. Each exacerbation of the morbid action is thus followed by increased symptoms and size of the gland.

9. The symptoms of chronic prostatitis thus vary with the mode in which the disease commences and proceeds. In the *consecutive form* (§ 7) they are merely the protracted continuance of a milder state of the symptoms than existed during the acute stage, either after intermissions or without, or with remissions of varying duration. When chronic prostatitis is *primary*, it is often long neglected, owing to the gradual increase of the inconvenience, and to the symptoms being mistaken for those of internal piles, until difficulty of micturition suggests the origin of the evil. When the gland

becomes enlarged from the continuance of inflammatory irritation, the patient has a sense of weight and bearing down, and a desire to go to stool, although the rectum is empty. The urine is voided every hour, or oftener, although but little has collected, and so slowly that it drops or dribbles merely from the orifice of the urethra; slight pain being felt in the glans penis and course of the urethra. The symptoms are increased by riding, walking, or standing, and are attended by symptomatic pains in the loins or down the thighs. There are generally, also, constipation and dyspepsia; sometimes headache or scaly eruptions on the skin; and occasionally slight hemorrhage from the urethra. The increased size of the prostate always interferes more or less with the exercise of the functions of the urinary bladder. The inability to discharge readily the contents of the bladder, owing to the impediment produced by the increased size of the gland, and by the associated changes in or near the neck of the viscus, is the chief and the most serious effect of this disease. If, after exertions to empty the bladder, an ounce or two of urine are left in it, the desire to micturate quickly returns, and renewed efforts are made in vain to expel it. This distressing symptom is much increased by exposure to cold or wet, by irregularity of diet, by stimulating liquors, and by constipation of the bowels. Sometimes, instead of retention, there is incontinence of urine; or, during sleep, the urine passes involuntarily.

10. Chronic inflammation, or enlargement of the prostate, with or without induration, is generally a disease of middle life or aged persons; but has also been met with in the young, chiefly in those who have been addicted to self-pollution. In these, as well as in other circumstances, the mucous follicles increase in size, and the surrounding cellular tissue becomes thickened, the prostate being thereby considerably enlarged, and the desire and difficulty of passing urine proportionably augmented. When the gland becomes so far enlarged as to prevent the entire evacuation of the urine, the retained portion becomes ammoniacal; pain and numbness are felt in the *glans penis*; sense of weight or uneasiness in the perinæum; pain in the back of one or both thighs, in the loins, and in the sciatic nerves; and the fæces are flattened. In aged or middle-aged persons, the enlargement is often complicated with hemorrhoids, or *prolapsus ani*, and sometimes with both. The ammoniacal smell of the urine becomes more offensive as the disease advances; and the urine, occasionally, is white and milky, owing, in some measure, to the extension of inflammation to the internal surface of the bladder. If, however, the urine be retained, it presents the appearance of coffee, occasioned by the admixture of blood with it.

11. Sir B. BRODIE remarks that, with far-advanced age, "the prostate usually, perhaps invariably, becomes enlarged." This change takes place slowly and at first imperceptibly; and the term chronic enlargement is not improperly employed to distinguish it from the inflammatory attacks to which the prostate is liable in early life. It may in some respects be compared with the chronic enlargement of the thyroid gland, known by the name of bronchocèle. Like the latter, it is generally slow in its progress, and

often, after having reached a certain point, it remains stationary for many years, if proper treatment be adopted. It rarely terminates in ulceration or in abscess.

12. Upon dissection, the prostate is found enlarged sometimes laterally, but most frequently in the middle or third lobe. Enlargement of the lateral lobes has existed to a very great extent without having occasioned retention of urine; but even moderate enlargement of the third or middle lobe may occasion retention; for, being situated immediately behind the orifice of the urethra, the urine behind the tumour formed by it presses it against the orifice, and it thus obstructs the passage. Sir B. BRODIE remarks, that the tumour of the third lobe varies in size from a horse-bean to an orange. When small, it is of a conical shape, with the apex projecting into the bladder, and the base continued into the gland; but when large, the base is often the narrowest part. In some instances there is another tumour also projecting into the bladder, formed by one of the lateral portions. The canal of the urethra where it passes through the enlarged prostate is generally flattened. Not infrequently the enlargement so alters the direction of the urethra, that, instead of pursuing a straight course through the gland, it is inclined first to one side and then to the other. The urethra is, in some cases, narrowed by the enlarged gland; but in others it is wider, and even dilated into a kind of sinus, where it lies in the centre of the prostate.

13. iii. THE DIAGNOSIS of enlargement of the prostate is determined by examination per rectum and by the introduction of a bougie or catheter into the urethra. The former mode, however, although it will furnish evidence of the existence of enlargement, may not determine the presence of enlargement of the middle lobe. The introduction of the catheter will, however, soon settle the question as to disease of this lobe. The symptoms of retention of urine from enlarged prostate are not very different from those caused by stricture, but Sir B. BRODIE remarks that the terminations are different. He has never seen a case in which the bladder has given way in the former, as sometimes happens in the latter state of retention.

14. iv. THE PROGNOSIS—A. Of acute Prostatitis depends upon the progress of the disease, and the age and other circumstances of the patient. At an early stage of the disease, and before the symptoms of suppuration have appeared, if the health of the patient be not otherwise bad, a favourable prognosis may be given; but in the aged, in a constitution exhausted by excesses, and especially if symptoms of abscess be present, a guarded or an unfavourable opinion should be entertained of the result. When the pain is throbbing, is attended by shivering, and the disease has passed eight days either unsubdued by treatment or neglected, then suppuration has generally commenced, and probably advanced through the connecting cellular tissue; and in this case the patient often ultimately sinks, either one or several abscesses being formed, which may open into the urethra, or into the rectum, or through the fascia, cellular tissue, and perinæum. But the abscesses may burrow and form fistulous passages, and cause wasting suppuration. An unfavourable

issue may occur before the abscess makes for itself an exit, owing to the retention of urine produced by it, and to consequent excrementitious plethora, causing fatal coma or apoplexy. This, however, will rarely occur when the patient receives medical aid. If the abscess opens into the urethra or rectum, the infiltration of excrementitious fluids through the orifice will rapidly aggravate the symptoms and accelerate the result. When the matter is early evacuated per perinæum, recovery may be expected, if other circumstances be favourable or the disease be uncomplicated, no serious disease of the kidneys or bladder being associated with it.

15. *B. The Prognosis of Chronic inflammation and enlargement of the prostate gland* is always unfavourable. When the patient is not very far advanced in age, and the constitution is otherwise not materially impaired, then the enlargement and hardening may sometimes be reduced, especially when the disease has not been of very long duration. But in advanced age, in weakened constitutions, and when the disease is associated with inflammation or structural lesions of the bladder or of the kidneys, little hope of recovery can be entertained, although life may be prolonged for a considerable time, if the complication be not of a very severe and dangerous nature, by careful treatment and regimen. Mr. Coulson observes, that "tumefactions of the prostate which are brought on by strictures, disappear when these are cured; it is necessary, therefore, to distinguish them from more permanent disease."

16. *v. Complications.*—Acute as, well as chronic prostatitis, with more or less enlargement of the gland, is not infrequently associated with one or other of the following affections: with the gravelly, especially the phosphatic diathesis; with calculeous concretions in the bladder or kidneys; with irritable, inflammatory, and thickened states of the bladder; with hemorrhoids or prolapsus ani; with gonorrhœa or gleet; or with stricture of the urethra. In the more chronic states of inflammatory action of this gland, and especially when the enlargement and induration are considerable, one or other, or even more than one of these complications, is often observed.

17. *vi. Treatment.*—*A.* In *acute prostatitis*, before symptoms of suppuration appear, the treatment should be strictly antiphlogistic, and consist of the application of leeches, or of cupping over the perinæum; of cooling diaphoretics, especially the liquor antimonii tartarizati, with liquor ammoniæ acetatis and spiritus ætheris nitrici, in camphor water; of Dover's powder at bedtime; of cooling saline aperients, and cooling lavement in the morning; and of farinaceous or vegetable diet. If there be much heat about the anus, a frequent injection of a cold fluid and cooling lotions to the perinæum and anus will be of use. And, in such cases more especially, the patient should recline on a horse-hair sofa, or sit upon an open cane-bottomed chair. The patient's beverages should be diluent and demulcent, and all stimulating and heating food and drink ought to be avoided. If retention of urine be threatened, owing to the swelling of the gland or of the middle lobe, and if cold enemata and cold lotions have failed, the hip-bath, demulcent and soothing elysters,

and fomentations or poultices to the perinæum may be resorted to. But, until these and the foregoing means fail, the introduction of instruments should not be attempted. When recourse to these is required, the able advice given by the surgical writers referred to in the *Bibliography* should be adopted.

18. *B.* If *suppuration* has commenced, Sir B. Brodie and Mr. Coulson advise an early external discharge for the matter, in order to prevent it bursting into the urethra. The early and free puncture of the perinæum down to the gland, save where little or no matter has yet formed, is generally useful, by the loss of blood, and the removal of the tension of the parts. If the disease have anticipated the operator, and the abscess have opened into the rectum or urethra, then the general health should be maintained. If it have burst into the latter canal, then a flexible catheter ought to be retained in the bladder, and such other means as the peculiarities of the case may require, aided by surgical assistance, ought to be adopted.

19. *C. Chronic inflammation and enlargement of the prostate* require at first small but repeated local depletions from the perinæum; abstinence from venereal indulgences; rest in the horizontal posture, and sleeping on a hair mattress; a farinaceous and vegetable diet, with cooling and demulcent diluents, and a gently open state of the bowels, procured by means of cooling aperients, as the conffection of senna with magnesia, or bi-tartrate of potash, or with sulphur. These means will be often of service, if persevered in for some time. If these fail, emollient injections, with henbane or sirup of poppies; or suppositories with henbane or hemlock; or the local applications of ointments containing the iodide of potassium, as advised by Mr. Stafford; and the internal administration of the iodide of potassium with liquor potassæ in camphor-water, or in mucilaginous or demulcent fluids, or with sarsaparilla; or the tincture of the sesquichloride of iron, taken in the infusion of calumba or of quassia, when the disease is associated with the phosphatic diathesis, or the hydrochlorate of ammonia in gradually increased doses, may severally prove of some service. Blisters and issues to the perinæum, mercurial ointments, camphorated and volatile liniments, anodyne, and narcotic suppositories, have likewise been recommended. The judicious employment of these may either prevent the accession of, or relieve, or even remove, retention of urine. But when these fail, recourse to surgical aid ought not to be delayed; and for opinions as to the employment of surgical means, I refer the reader to the works enumerated below.

II. ORGANIC LESIONS OF THE PROSTATE GLAND.

CLASSIF.—IV. CLASS, IV. ORDER. (See *Preface*.)

DEFIN.—*Changes of structure of the prostate gland, of various kinds, resulting generally from prolonged vascular excitement, or functional or nervous irritation, causing disorder of, or obstruction to, the urinary excretion, and often associated with other affections of the urinary organs and rectum.*

20. *i.* The most frequent ORGANIC LESIONS of this gland are ENLARGEMENT and INDURATION, consequent upon chronic inflammation.—*a.* But these changes may take place independently of any actual inflammatory action, frequent func-

tional excitement consequent upon entertaining prurient ideas, or upon frequently practiced self-pollutions or other venereal excesses, often occasioning these lesions independently, as well as in consequence of inflammatory action, either acute or chronic. There is every reason, moreover, to infer that sexual desires and frequent excitement of the genitals are attended by more or less active congestion of the prostate, with or without increased prostatic secretion, which, if continued habitually for a long period, will pass into enlargement and induration, and often occasion obstruction to the excretion of urine. M. VELPEAU notices, by the appellation of "*Catarrh of the prostate*," an increased flow of the prostatic secretion, arising from prolonged gonorrhœa or gleet, or frequent attacks of these, and appearing chiefly when the patient has been to stool or has passed his urine. Although sometimes supervening upon inflammatory states of the urethra, this morbidly increased secretion is more frequent after habitual self-pollutions and sexual excitement, and is attended by congestion or active determination of blood to the gland with more or less enlargement, and with several of the symptoms of prostatitis in a slight degree.

21. *b.* Swelling or enlargement of the gland from a varicose state of the vessels, mentioned by CÆLIUS, is merely a form of congestive or non-inflammatory enlargement. It generally occurs slowly in old persons, after venereal excesses, after repeated attacks of gonorrhœa or gleet, after hemorrhoidal complaints and constipated bowels, and after abuses of stimulating liquors. It is met with most commonly in the sedentary and those who live richly; the difficulty of emptying the bladder increasing, and becoming great, especially after violent exertion, and after heating food and drink. The swollen prostate is felt *per rectum*, but it is free from pain, and there is no pain in the passage of urine through the urethra. "The varicosity is situated rather in the coverings of the prostate. The substance of the gland itself is sometimes soft and spongy, sometimes tense and hard."

22. *c.* The treatment of these states of enlargement of the prostate depends much upon the evidence of their source. If they be consequent upon congestion or active determination to the organ, and if the constitution be not remarkably impaired, local depletions should be prescribed. Clysters of cold water, or of the decoction of oak-bark, with alum; attentive regulation of the bowels; and a cautious use of the catheter, with the other means suggested for the removal of the chronic states of prostatitis, are generally of service (§ 19).

23. II. TUBERCULAR DEPOSITES IN THE PROSTATE, and small puriform collections disseminated through the gland, are mentioned by M. VELPEAU as having been, in rare instances, observed by him, and attended by more or less swelling. They may go on to ulceration or abscess, and terminate in fistulous communications with the urethra or rectum.—*a.* Dr. BAILLIE has also observed *scrofulous disease* of this gland, as, upon dividing it, a white curdy matter has been found in it; and scrofulous pus has been forced out of its ducts. Mr. WILSON states that he has seen the prostate enlarged and changed into a white curdy matter, precisely the same in quality as that formed in a

scrofulous absorbent gland. Mr. GUTHRIE has met with a case in which the enlargement caused by scrofulous deposits or suppuration of the prostate was remarkably great. It is probable that these scrofulous changes are merely the results of sub-acute or chronic inflammation of the gland, occurring in scrofulous subjects, and giving rise to the formation of scrofulous pus, in the form either of small deposits or of larger collections, which become more or less altered by the absorption of their more watery parts, or by the occurrence of consecutive irritation and softening.

24. Mr. WILSON states that scrofulous swellings of the prostate are usually found in persons not advanced beyond the middle period of life; that they are slow in their progress, and not attended by much pain; that they may be felt *per anum*; and that their effects upon the excretion of urine depend upon the size and form they assume.

25. *b.* The treatment of scrofulous enlargements of the prostate consists chiefly in the use of the iodide of potassium with liquor potassæ and sarsaparilla; of sea-water, or of cold water with salt dissolved in it, topically, and occasionally as a clyster; of sea-bathing and sea-air; and of the application of an ointment of the iodide of potassium to the gland in the manner recommended and explained by Mr. STAFFORD.

26. III. ULCERATION OF THE PROSTATE is sometimes observed.—*a.* It rarely occurs in the anal aspect or surface of the gland, unless as a consequence of the extension of ulceration, or of cancer of the rectum. It is not infrequently seen in the urethral surface of the gland, sometimes near the bladder, but oftener near to or on the *verumontanum* itself. Ulceration is a consequence generally of scrofulous disease of the prostate, or of purulent formations, or of injuries occasioned by bougies or catheters.

27. *b.* The diagnosis of ulceration of the prostate is very obscure. The appearance of blood on a bougie, or after micturition; the existence of pain in the situation of the gland, and the acute exacerbation of pain upon the passage of a bougie, and upon micturition, will suggest the probable existence of ulceration, but by no means prove it; inasmuch as these symptoms attend inflammation of either the prostate itself, or of the prostatic portion of the urethra.

28. *c.* The treatment which these symptoms suggest will depend upon, and vary with the circumstances of the case, but it will not be materially different from what has been recommended above for the consequences of *prostatitis* (§ 18, 19).

29. IV. HEMORRHAGE FROM THE PROSTATE may occur from ulceration, from the opening made by an abscess, from the accidental rupture of vessels, or from injury by a catheter. In these the hemorrhage is rarely very great, and the blood passes by the urethra; but when it is excessive, it may flow into the bladder, where its presence, especially its coagula, always occasions distress. In a case published by Mr. COPLAND HUTCHISON, the bladder was suddenly filled with blood, which proceeded from "two fungoid tumours which projected into this viscus from the prostate gland." The bladder was perfectly healthy. The entrance of the urethra was situated between the two tumours; the left being about the size of a hen's egg, and

the other that of a walnut. (*Lond. Med. Repos.*, vol. xxii., p. 130.) The treatment of hemorrhage from the prostate does not differ from that advised for hemorrhage from the urinary passages. (*See art. HEMORRHAGE*, § 215.)

30. V. FUNGO-ENCEPHALOID DISEASE AND CANCER have been met with in the prostate.—A. In the former, either the fungoid or the encephaloid structure may predominate. This form of malignant disease may be primary and solitary, as in an interesting case recorded by Mr. STAFFORD; or it may be a part only of a more general manifestation of this malady.

31. B. *Carcinoma*, or scirrhus-cancer, of this gland is rarely seen; but the prostate may be implicated in scirrhus, or cancer of the rectum. It is rare that scirrhus of the prostate occurs primarily, or in an uncomplicated form. Sir B. BRODIE, however, has adduced cases in which scirrhus appears to have affected this gland primarily.

32. C. When fungo-encephaloid malignant disease is seated in the prostate, there is not only great enlargement and retention of urine, but also an elastic or soft tumour felt *per anum*, sometimes with hemorrhage from the urethra, following efforts to pass urine. A scirrhus state of the gland is indicated by acute intermitting pains in the prostatic region, unconnected with the excretion of urine, and enlargement with a stony hardness of the prostate felt *per anum*, in addition to the usual symptoms of chronic enlargement.

33. VI. CALCULI IN THE PROSTATE.—The calculi found in the cavities of the prostate have been too generally viewed as quite different from those formed in the bladder, and as being altogether similar to those concretions sometimes found in the salivary ducts and elsewhere. It is not improbable that, while there are some which thus originate, there are others which are formed chiefly from urinary deposits; or which, originating in the gland itself, become greatly enlarged by urinary deposits, the prostatic calculi being only the nuclei around which these deposits are formed. It should be recollected that, when there is obstruction to the passage of urine through the urethra, owing to stricture, the prostate gland is then sometimes seen with its follicular cavities very much widened, and its ducts dilated; the latter being even as much enlarged as to admit of the introduction of a crow-quill. When, therefore, the urine is prevented from passing by stricture, or passes only in small quantity, some of it is forced into the ducts and cavities of the gland, which thereby become enlarged, the muscular coat of the bladder being also gradually thickened. In these circumstances, if prostatic calculi exist, they will readily increase, owing to the passage of urine over them, or the stagnation of it around them; but when the ducts and cavity become thus dilated, and admit the urine during efforts to expel it, the calculi may actually form in the prostate from the urine thus propelled into and accumulated in the cavities of the gland. I consider that calculi may form in the prostate, or be found either altogether or partly in it, as follows: 1st. They may form in the gland, or in its ducts, independently of any access of the urine, or deposit from this excretion; and in this case they are small and numerous, consisting chiefly of the

carbonate or the phosphate of lime, with a large proportion of animal matter. 2d. Calculi may form in the ducts and cavities of the gland consecutively of stricture of the urethra, owing to the passage into and stagnation of urine within these parts, as shown above; and may afterward increase so as to be partially external to the gland; in this case they may be similar, in chemical constitution, to other urinary calculi, according to the existing calculous diathesis, and may reach a large size. 3d. They may originate in the first of these modes, and subsequently increase greatly in size, owing to urinary deposit, as in the second mode. 4th. Fragments of calculi may escape into dilated prostatic ducts or cavities after lithotomy, or small gravelly calculi may pass into the ducts independently of this operation, where they may increase, as in the second mode of formation.

34. The first or true prostatic calculi vary in size from that of a pin's head to that of a pea, and in number from eight, ten, or twelve to forty or fifty. They are often attended by little inconvenience until they obstruct the excretion of urine; but, in rare instances, they occasion distressing irritation and excitement. Two remarkable cases of prostatic calculi are reported by Dr. HERBERT BARKER (*Trans. of Provin. Med. and Surg. Assoc., N. S.*, vol. ii.), and by Professor FERGUSSON (*Lond. Med. Gaz.*, Jan. 7, 1848). The calculous deposit was most probably formed, in these cases, in the second of the modes now pointed out. Indeed, Professor FERGUSSON mentioned to me, that this was the probable mode of their formation in the case operated upon by him, as they were preceded by stricture of the urethra. Dr. PROUT believes that the larger calculi, which are smooth and polished, and have a porcelain-like appearance, always originate in abscess of the prostate, but it will be found that they are formed in the cavities of the prostate consecutively of stricture of the urethra, as shown above.

35. Dr. CROSSE, of Norwich, remarks, that "it is only when large or numerous in one large cyst, or projecting into the urethra, that prostatic concretions give rise to the symptoms of stone; frequent painful micturition, and discharge of mucus from inflammation of the urethra and neck of the bladder. They seem to be sufficiently often combined with stone in the bladder to lead us to suspect that the one disease contributes to the production of the other; and, indeed, I consider that urinary calculi, stricture of the urethra, or whatever other diseases here situated, causing inflammation of the prostatic part of the urethra, and interrupting the free exit of the excretion of the prostatic ducts, dispose to the formation of calculi of this description." These observations, by so learned and experienced a surgeon, show the connexion I have contended for; while his subsequent remarks indicate that the third mode in which I have viewed the formation of those calculi (§ 33) is one to which he most justly attaches great importance, although he generalizes more in respect of them than agrees with my views. "A distinction to be kept in mind in respect of prostatic calculi is," Dr. CROSSE observes, "that they are not urinary concretions, but are formed and may increase without the urine having access to them; they may,

notwithstanding, rise to the orifice of the prostatic ducts, or get into, or be detained in the urethra, or pass retrograde into the bladder, becoming the nuclei around which depositions from the urine take place." This is one of the modes of formation which I have enumerated, and I could not have an abler authority upon which I might found my views.

36. *B. The Diagnosis of prostatic calculi* is seldom very clear, unless the calculi are large or numerous, or project into the urethra or bladder. Mr. Coulson justly observes, that "a retention of urine or pain about the neck of the bladder, and frequent desire to make water, are sometimes the only symptoms; and these are common to several other affections of the prostate gland urethra." *Per anum* the gland may be felt to be enlarged; and, in some instances, the calculi may, by their number, form, or size, furnish sufficient evidence of their presence, as in a case mentioned by Dr. Marcet, where they could be plainly felt through the coats of the rectum. When the calculi project from the gland into the urethra, the sound will strike against it; but it will still be a question whether or no the calculus be one which has passed out of the bladder into the urethra. The history of the case, and the existence previously and at the time of symptoms referable to the prostate, will be the chief guides to a diagnosis. When they strike or grate against an instrument, they will occasion sensations in both the prostate and perinæum, and in the *glans penis*, which will indicate their nature. When very large or numerous, they may be felt, as if in a cyst, *per anum*, or they may protrude so as to be felt in the perinæum.

37. *C. Treatment*.—When severe symptoms are produced by prostatic calculi, then dysuria, stricture, sacculi, inflammation, and thickening of the coats of the bladder all ensue; and in extreme cases, and when it is fully ascertained, upon the requisite examinations, that large or numerous prostatic calculi are present, it will be right, as advised by Dr. Crosse, to cut down to the prostatic gland from the perinæum, as in the lateral method of litho-cystotomy, and to remove the concretions. An interesting case, recorded by Mr. Coulson (*Op. cit.*, p. 273), will farther illustrate the treatment, which is entirely surgical; and to this, as well as to the remarks of other eminent writers noticed in the *Bibliography*, I must refer the reader.

38. vii. CONCRETIONS FORMED IN THE VEINS, about the prostate gland and neck of the bladder, have been noticed by MECKEL, TIEDEMANN, OTTO, LOBSTEIN, and CROSSE. The last-named author states, that "in aged persons, particularly with hypertrophy of the prostate, a bladder diseased, and the veins about it and the rectum varicose, concretions of phosphate of lime or carbonate of lime, varying in size from a pin's head to a kidney-bean, are often found in the veins." Sometimes they present the appearance of a white pea, and an inequality or projection answering to the part by which they adhered to the vessel. These concretions have no connection with urinary or other excretions, and are merely growths or concretions which had been adherent to the coats of the vein. They approach nearer to ossific than to calculeous concretions. (CROSSE, *Op. cit.*, *passim*.)

39. viii. THE COMPLICATIONS of organic le-

sions of the prostatic gland are those already noticed (§ 16), especially inflammation and thickening of the coats of the bladder; structural lesions of the kidneys, strictures of the urethra, gleet, and gonorrhœa; involuntary pollutions; the several diseases of the rectum, particularly hemorrhoids, prolapsus ani, stricture, or scirrhus; constipation and various affections of the colon, hemorrhage from the urinary bladder, or from the urethra, or from the rectum, and intestinal worms.

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PRURIGO.—SYNON. *Cnesmos* (χνησμός, Galen); *Pruritus*, *Scabies papuliformis*, Auct. *Exzornia Prurigo*, Good. *Das Jucken*, Jeukte, Germ.

CLASSIF.—6th Class, 3d Order (Good). 1st Order, 3d Genus (Willan). III. CLASS, I. ORDER (Author in Preface).

1. DEFIN.—An eruption of papulæ, larger than those of lichen, not materially differing from the colour of the skin; attended by excessive heat and pungent itching; becoming covered with small black scabs when scratched or abraded; leaving behind them yellowish stains; very chronic in duration, but not contagious, and generally unattended by fever.

2. This eruption generally appears about the neck and shoulders, and sometimes extends to the face, trunk, and limbs, more especially to the back; and to the outer sides of the arms and thighs, in the line of extension, and assumes a severe character. It is occasionally confined to a single spot. Its mildest forms may decline in the course of three or four weeks; but much more frequently it continues several months, or even years, and is attended by a burning and intolerable itching. WILLAN has distinguished three varieties, which may be modified in certain localities, or be limited to these localities, thus assuming three local forms. The varieties, according to WILLAN and other writers, are *Prurigo mitis*, *P. formicans*, and *P. scutis*. The first and second differ from each other merely in degree, there being no fundamental distinction between them. The third variety has some peculiar characters.

3. I. DESCRIPTION.—1. *Prurigo mitis* appears in the form of small and slightly prominent papulæ, broader than those of lichen, soft and

smooth to the touch, and of the same colour as the skin. They are attended by incessant itching, which is greatly increased upon the removal of the clothes, by changes of temperature, by the warmth of bed, and by exercise. When left to themselves, or not aggravated by scratching, or by a heating regimen, they subside, with a slight exfoliation of the epidermis; but more commonly the relief of the pruritus attempted by scratching causes the removal of the tops of the papule, which then become covered by a small characteristic black scab, formed by the drying of a minute exudation of blood on the abraded spot. If the papule be much irritated, ecchymatous pustules are sometimes developed. This form of the eruption is most frequent in the spring and summer months in the situations above mentioned (§ 2). It is often preceded by slight disorder of the digestive and excreting functions, especially of the latter, and occasionally by slight acceleration of pulse; but these are usually overlooked. The mildest cases may terminate in about three weeks; but more frequently fresh papule appear as the preceding vanish, and the eruption may thus be prolonged for several months.

4. ii. *Prurigo formicans* is merely a severer form of the preceding. The papule are, however, generally larger—broader and more prominent, yet flat. They are distinct, nearly of the colour of the skin, if not torn by the nails, and commonly seated on the neck, back, loins, and external aspect of the limbs, although they may appear also on other parts. They are sometimes very numerous in young subjects. The itching is more severe and pungent than in the first variety, resembles the gnawing of innumerable ants or the pricking of hot needles, and is increased towards evening by the heat of bed, and by the circumstances already noticed. RAYER remarks, that patients describing their feelings liken them to burning fires and maddening itchings. ALIBERT says that PLATO, CHARLES V., CHARLES IX., and other great men, were afflicted with this eruption; and that the Abbé MORELLET, at the age of eighty, expressed himself as writhing on "St. LAWRENCE'S gridiron" when suffering from it. The warmth of bed sometimes increases the itching to such a pitch as to cause the patients to scratch themselves until they bleed, and as to prevent sleep until morning, or until exhaustion sinks them into it; when they often soon awake to be similarly tormented. The black scabs following the scratching are frequently the chief appearance of eruption, although redness of the skin is often produced for a short time by the scratching. The affection continues for months, and, with varying remissions or intermissions, often for years, especially in weak children and adults, and in old persons. After the subsidence of the eruption the skin remains dry and thickened, and the epidermis exfoliates. This form of the complaint is generally preceded by disorder of the abdominal organs, and by slight fever, which tend to complicate and perpetuate it. Like numerous other cutaneous affections, it should be viewed as a local manifestation of disorder implicating the excreting functions and the state of the circulating fluids, and requiring a treatment directed accordingly. It may occur in both children and adults at any period of the year.

5. iii. *Prurigo senilis*, or *Scule prurigo*, closely resemble prurigo formicans; but the papule are harder, larger, and more confluent. It is attended by incessant and insupportable itching, and may endure for years, with varying severity. The papule are intermingled with small black scabs and numerous scratches, caused by attempts to relieve the pruritus. In more prolonged cases the skin becomes swollen, inflamed, and as if thickened; and the affection is sometimes complicated with eruptions of vesicles, pustules, or boils, according to the constitution and regimen of the patient. Abscesses are even occasionally formed. But these external associations generally proceed from more or less marked disorder of the assimilating and excreting functions, more especially of the liver, bowels, and kidneys, with or without gastro-intestinal irritation or febrile excitement.

6. In a severe case of senile prurigo, WILLAN found a number of minute *pulices* upon the skin, and he remarked the frequent association of the *pediculus vestimentorum* with this eruption. In very old persons, or in the debilitated, when the eruption follows febrile diseases, and in those who live on poor, unwholesome food, but especially in debilitated persons in the decline of life, swarms of *pediculi* not infrequently complicate this affection. There is, however, also more or less disorder of the abdominal functions, with either a poor or impure state of the circulating fluids.

7. iv. *Local Forms*.—These are merely the occurrence or limitation of prurigo—of its characteristic eruption, to certain localities, where it usually becomes severe and prolonged, and occasionally produces additional annoyance or distress. In the several localities constituting these forms, the eruption is similar to some one of the varieties already described; the locality favouring no one variety more than another.—*A. Prurigo podicis* is generally an eruption of papule similar to those of *P. mitis*, but more frequently to those of *P. formicans* around the anus, sometimes extending to the perinæum, between the nates and thighs. The symptoms and duration of the eruption are the same as stated above. After its long continuance the skin around the anus becomes rough, thickened, and otherwise altered.—*B. Prurigo scroti* is merely the extension of the eruption to the scrotum, and is not farther peculiar in any respect, the symptoms and sufferings being the same as in the several varieties.—*C. Prurigo pudendalis* is seated chiefly in the *labia majora* and mucous surface of the *vulva*. It is attended by constant but varying pruritus, occasioning swelling or inflammation of the parts, sometimes with a serous exudation; and it induces sexual excitement and self-pollution, amounting in some instances to nymphomania. This form sometimes occurs during pregnancy, and occasions much misery.

8. II. *DIAGNOSIS*.—Prurigo is distinguished by the absence of colour from the papule, and by the stinging or burning pruritus. It may, however, be confounded with *lichen* and some of the *vesicular eruptions*.—(a) It is distinguished from *lichen* by the larger size of the papule, by the small black scabs, and by the intense burning itching.—(b) Prurigo is most likely to be confounded with *scabies*, but the papule of

prurigo are flattish and of the same colour as the skin, while the vesicles are acuminate and rose-coloured. The vesicles of the latter terminate in yellow scabs, and occur in exactly opposite situations to those in which prurigo appears, namely, in the internal surfaces of the limbs and in the line of flexion. The pruritus of scabies is also much more supportable than that of prurigo.—(c) Prurigo may co-exist with lichen, scabies, and eczema, and with the pustules of impetigo and ecthyma. It terminates by resolution or by furfuraceous desquamation.

9. III. PROGNOSIS.—Prurigo is not attended by danger in the young, robust, or otherwise healthy, although it may prove very obstinate and harassing to the patient. In debilitated, cachectic constitutions; in old and ill-fed persons; and where cleanly habits are not duly observed, it is often incurable; and if it be associated in these with visceral disease, it may tend to shorten life. In the complications especially, and particularly in those with disorder of the abdominal organs, either the suppression of the external eruption, or the development of acute disease of these organs, may be attended by severe or dangerous symptoms, especially if the eruption disappear rapidly.

10. IV. CAUSES.—The first and second varieties of prurigo occur chiefly in children and adults, and at all seasons, but more frequently in spring and summer. Senile prurigo is most common in the old, ill-fed, and in connexion with an impoverished or impure state of the blood. Low and damp situations; poverty, and the want of cleanliness; unwholesome, deficient, or poor diet; the use of salt, stale, or dried, or otherwise preserved fish, or of shell-fish; heating and stimulating liquors and condiments; impaired excreting functions, especially by the liver, bowels, kidneys, and skin; the neglect of aperient or chologogue medicines, and of due evacuations; visceral disorders occasioning, or even consequent upon, the accumulation of effete materials in the circulation; the suppression or interruption of various depurative functions, as amenorrhœa, &c.; the use of dirty clothes, or of foul woollen bed-clothes, and of foul or impure beds, stuffed with animal productions, as wool or feathers which have become contaminated by the perspiration of many years of occupation; the influence of mental emotions, and interruptions of the excreting functions, severally and in various states and forms of association and succession, occasion this and various other chronic eruptions.

11. V. TREATMENT.—In all cases, especially the more protracted, of this complaint, the state of the abdominal viscera, and of the several excretions should be closely examined, and existing disorder of these corrected or removed.—A. If abdominal plethora or congestion of any of the abdominal viscera be present, a moderate vascular depletion may be prescribed; and PLUMMER'S pill with soap be given at bedtime, and an aperient in the morning, consisting of the electuary of senna with magnesia and milk of sulphur. A dose of a bitter infusion, as calumba or chereita, may be taken once or twice daily, with the sesquicarbonates of potash and ammonia. Having removed accumulated or morbid excretions, and promoted the discharge of effete materials from the blood, the healthy

functions of the skin should be restored by a frequent use of warm alkaline, or of soap, or of sulphur baths; and by the internal administration of sulphur with magnesia, or with an alkaline carbonate, every night, or both night and morning. When the skin is dry and rough, these baths may be alternated with vapour baths, or with baths containing the bi-borate of soda, and followed by warm baths with gelatin or mucilaginous substances, as tragacanth, two or three days being allowed to elapse after the mucilaginous baths in order to observe their effects. These last baths may likewise contain either of the alkaline sub-carbonates, from one to four ounces to each bath, according to the size and age of the patient. Where the skin is delicate and irritable, then irritating baths and applications ought to be avoided; simple warm or soap baths, or gelatinous, emollient, or mucilaginous baths being most serviceable. If these fail, the state of the assimilative and excreting viscera should be strictly examined, in order to detect lurking disorder; for generally to this cause is the obstinacy of the complaint owing, and to it, also, are to be imputed the injurious and often dangerous consequences of suppressing the eruption before, or without, attending sufficiently to the states of the abdominal functions and organs.

12. Various ointments and greasy or oily applications have been recommended for this eruption, especially those containing sulphur, the iodide of potassium, and muriate of ammonia; but independently of the unpleasantness of such applications to an extensive surface, they soon become, owing to the action of the air upon them, more or less irritating, although they may at first have afforded a little ease. If they be at all prescribed, they ought to be followed, in eight or ten hours, by a warm saponaceous or emollient bath. Instead of these I have generally employed a lotion with the hydrochlorate of ammonia; or a very weak solution of the bi-chloride of mercury, with or without the vinum opii, or watery extract of opium; or a solution of the sulphuret of potash; or a solution of the bi-borate of soda, or chlorate of soda or potash, or of the alkaline sub-carbonates, or diluted pyroligneous acetic acid, with the addition of creasote. These are severally beneficial; and while camphor-water, rose-water, or elder-flower water may be used as the vehicles of the active agents, opium, or hydrocyanic acid may be added, according to the circumstances of the case. In the more obstinate cases, I have prescribed, after due attention to the abdominal functions and organs, a weak solution of the iodide of potassium, with a watery solution of opium, as a lotion, and sometimes also this iodide or the iodide of iron internally, with sarsaparilla or with taraxacum, and have observed much benefit accrue from the treatment.

13. B. The senile variety of prurigo will generally be removed, if it be capable of removal, by the means above recommended, especially if due attention be paid to the states of the several excreting viscera, and to diet and regimen. The utmost cleanliness should be observed, and as there is often not only debility, but also anæmia, or an impoverished state of the blood, in these cases, tonics and chalybeates should be associated with carbonate of ammonia, or

with either of the other alkaline carbonates in the treatment. The patient should sleep on a hair mattress; and the bowels ought to be duly regulated by means of sulphur with magnesia, or of any stomachic aperient which may be found to agree the best, as the infusions of gentian and senna with the sesquicarbonates of ammonia and of soda.

14. When the eruption is associated with the production of *pediculi*, a tonic treatment is more especially required, aided by cinnabar fumigations, or by frequent sulphur baths, or by lotions with the bi-chloride of mercury. A trial, in the most obstinate cases, may be given to *mineral waters*, especially when the excreting organs are torpid. The waters of *Cauterets*, or of *Bonnes*, or of *Bareges*, or of *Carlsbad* may be taken. Of these the *Bareges* water may be preferred; but I believe the sulphureous waters of *Harrogate*, or of *Gilsland Spa*, or of *Moffat* to be equally, if not more beneficial in this complaint, aided by warm bathing, due exercise, and appropriate diet. While the diet is sufficiently nutritious, it ought to be digestible; and fish, shell-fish; pork, veal, ham, bacon; heating condiments and rich sauces, coffee, and stimulating beverages should be avoided.

15. *C. The local varieties* require chiefly the means already noticed.—(a) *Prurigo podicis* and *P. scroti* are often connected with chronic irritation of the rectum and of its mucous follicles, owing either to the presence of *ascarides* or to *hemorrhoidal affection*. In these cases, small injections of some of the lotions above mentioned into the rectum; great attention to cleanliness; the treatment, local and general, advised for these diseases; the application, by means of a sponge, of the lotions already enumerated (§ 12), or of a weak solution of the acetate of lead with vinum opii, especially immediately after each stool; local fumigations with sulphur or cinnabar, and an occasional application of leeches in plethoric persons, will seldom fail to remove the complaint, which, however, is very prone to recur, after neglect or errors of diet and regimen.

16. (b) *Prurigo pudendalis* being sometimes occasioned by disordered catamenial functions, or by leucorrhœa, or by pregnancy, and complicated with either of these, requires an especial reference to the existence or non-existence of either. In these cases, the internal, external, and dietetic means already specified are of more or less service; but in these complications they may all fail, and the patient be reduced to a state of great misery. Treatment often fails during pregnancy, although the complaint will generally disappear after delivery. In some cases it has recurred in each pregnancy, and has even reappeared after the change of life. The application of leeches to the vulva; cooling aperients and enemata, and cooling and detergent injections *per vaginam*, or similar lotions to the *vulva*, are commonly of use. It is not rare to find this variety associated with one or more small boils of the labia majora, and in these cases the lead lotion with vinum opii will remove the affection at any early stage, and poultices or warm fomentations afford relief at a more advanced state. *Prurigo vulvæ* has generally disappeared, after the use of a lotion consisting of a saturated solution of the bi-borate of soda in rose or elder-

flower water, either with or without the addition of the vinum opii, or of the pure acetic acid, or of both.

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PRURITUS—SYNON. *Hyperæsthesia cutis*—*Itching*, morbid sensibility of the skin—*Prurit*, *Démangeaison*, Fr. *Das Jucken*, die *Reitzbarkeit*, Germ.

CLASSIF.—III. CLASS, I. ORDER. (*Author in Preface*)

1. DEFIN.—*Itching over a greater or less extent of the cutaneous surface, or limited to a particular part without any perceptible eruption, and generally symptomatic of some internal disorder.*

2. Pruritus, more or less general, is usually symptomatic of disorders of the digestive organs, or of some irritation of the digestive canal, especially intestinal worms. In these cases, the irritation of the mucous surface is propagated to, or reflected upon, the extremities of the nerves supplying the skin. The itching is often annoying, and is generally remittent; but it often continues in this form for many months. It is exacerbated by the same causes as those which increase prurigo, especially by changes of temperature, by stimulants and heating condiments, by hot spices, by opium, and by directing the attention to it. In some idiosyncrasies, various articles of diet or of medicine occasion it; and then it usually continues only for a short time. Shell-fish, or fish of any kind; smoked, dried, or preserved meats, &c., sometimes cause it. It is not infrequently a symptom of disorder of the uterine discharge of hysteria; of the slighter states of irritation of the spinal chord or membranes, and of several eruptions.

3. *i. The local or limited states of pruritus* or itching may arise from the same causes as those now mentioned, but they much more frequently proceed from others more immediately connected with the seat of itching. In most instances, however, of local pruritus there is more or less functional disorder of the digestive organs, or accumulation of fecal or excremental matters.—(a) *Pruritus nasi* is often sympathetical of intestinal worms, and even of *ascarides* in the rectum, or of fecal collections in the large bowels, or of dyspeptic disorders.—(b) *Pruritus urethræ* is often a very troublesome affection. Itching of the extremity or course of the male urethra is most frequently caused by calculus or gravel in the bladder, or by irritation of the prostate gland or stricture of the urethra. In females it is connected either with calculus in the bladder, or with leucorrhœa or uterine disorder.—(c) *Pru-*

ritus vulvæ is often a most distressing affection. It is seated chiefly in the labia majora, but it frequently implicates the clitoris and nymphæ, or even extends up the vagina. It is usually caused by ascarides in the rectum, by disorder of the catamenia, by leucorrhœa, by self-pollution, and by hemorrhoids. It is not uncommon during the periods of puberty and the cessation of the menses, and especially during pregnancy.—(d) *Pruritus ani* is often a very troublesome and obstinate complaint, and is most annoying soon after retiring to rest. It is usually caused by ascarides in the rectum, by hemorrhoids, by fistula ani, by neglect of cleanly habits, by morbid states of the intestinal secretions, especially of the mucous follicles of the rectum, and by irritation or congestions of the prostate gland and vesiculæ seminales. It is often complained of by persons of sedentary occupations and habits, and by those who sit on soft and warm cushions. The itching, although occurring independently of any visible eruption, when repeated or protracted, often occasions slight excoriations and thickening around the margin of the anus.

4. ii. *Diagnosis*.—*Pruritus* can be confounded only with *prurigo*, from which it is distinguished by the absence of any visible eruption, unless such redness, or excoriation as may result from scratching, and the mechanical irritation employed to remove or relieve this annoying sensation.

5. iii. *Treatment*.—This should be directed to the removal of the morbid condition of the viscera, upon which the *pruritus* depends. This is most effectually accomplished by occasional doses of spirits of turpentine and castor oil, and by enemata of the same, so as fully to evacuate all accumulated or morbid matters from the bowels. Afterward the lotions I have prescribed for *PRURIGO* (§ 12), especially the lead lotion with opium; diluted vinegar or lemon-juice with creasote; a weak solution of bichloride of mercury with some hydro-chlorate of ammonia; or the solution of the biborate of soda. Attention should be directed, in the treatment of the *pruritus* of females, to the state of the uterine functions, which ought to be duly promoted; and when congestion of the uterine organs, or of any of the abdominal viscera, is present, especially if the patient be young and plethoric, or if the parts become hot or excoriated, then local depletions, followed by hot fomentations, are required. The diet, regimen, and treatment are in most respects the same as advised for *PRURIGO*.

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PSOÆ MUSCLES—INFLAMMATION AND SUPPURATION OF.—SYNON. *Psotitis*, Auct. Lat. *Psotite*, *Inflammation des Muscles lombaires*, Fr. *Entzündung der Lendenmuskeln*, Germ. *Psoas abscess*; *Lumbar abscess*.

CLASSIF.—III. CLASS, I. ORDER. (See Pref-ace.)

1. DEFIN.—i. NOSOLOG.—*Pain in the loins, generally on one side, commencing and existing insidi-*

ously, but often becoming severe, and extending to the hip, thigh, and knee-joint, caused by inflammation and suppuration, the pus collecting around the muscles, and descending with more or less tumour, either under POUPART'S ligament or in some other direction.

2. ii. PATHOLOG.—*Inflammation of the cellular tissues surrounding the psoæ lumbar and adjoining muscles, generally originating in caries of the bodies of the vertebra, or in inflammation of the intervertebral substance, the muscles themselves ultimately becoming disorganized, and the purulent collection gravitating in the course of the cellular tissue, and opening or forming a tumour as above and as hereafter stated.*

3. I. THE CAUSES OF *Psoas* or *lumbar abscess* are, the serofulous, the rheumatic, and the gouty diathesis; a cachectic habit of body, tubercular changes or deposits in the bodies of the vertebra; caries of the vertebra, especially the lumbar; inflammation of the intervertebral substance; violent exertion of the lumbar muscles, external violence, severe strains, or sudden jerks or twists of the loins; currents of cold air on the back or loins; and ulcerations of the cæcum extending to the peri-cæcal cellular tissue. Caries of the dorsal or lumbar vertebra, or inflammation of the intervertebral spaces are the most common causes of *psotitis* and lumbar abscess. Of nineteen cases detailed by ABERNETHY, only two were independent of disease of the spine. He observes, that the general opinion of surgeons, in which he entirely concurs, is, that lumbar abscesses most frequently arise from diseases of the vertebra; and they should certainly all be treated as if such were their origin.

4. II. SYMPTOMS.—*Psotitis* sometimes occurs suddenly, and the patient complains of pain in the loins, especially on one side. Walking becomes troublesome; the thighs can be neither raised nor extended without pain. The disease sometimes commences gradually, with pricking pains, which, becoming more severe, extend to the hip, and to the thigh, and even to the knee-joint. Sometimes the progress of inflammation is so insidious as hardly to be noticed, until the mischief appears in the form of a purulent collection. According to the extent of vertebral disease and the degree of inflammation does suppuration appear early or late; but the abscess which is formed generally assumes a chronic state, and is of a symptomatic character, as it is consecutive of inflammation and caries of the vertebra. The chronic abscess, termed *psoas* or *lumbar abscess*, commonly forms in consequence of disease of the vertebra of the back or loins. Matter is secreted around the diseased vertebra, and then descends through the loose cellular tissue covering the muscles along the side of the pelvis into the thigh. It may take a course towards the back, or may go in various directions either within or without the pelvis. The pus formed about the seat of caries remains there for a longer or shorter time, especially in the cellular tissue. As the pus collects and increases it forms a cyst, which descends, and lengthens as it inclines to either or to both sides of the vertebral column. As the pus accumulates it pushes onward the lower end of the cyst, which, if it meet with any obstacle, spreads out, but contracts when pressed on by the adjoining parts, and dilates again

when relieved from pressure, until it at last arrives at the place, when it projects or breaks. In the route which the purulent matter thus takes, the *psosæ* and other lumbar muscles are inflamed, pressed upon, partially absorbed and disorganized, owing to the extension of the inflammation and purulent infiltrations to them and their connecting cellular tissue.

5. The abscess most frequently protrudes below *POUPART'S* ligament, and it generally extends or opens at a greater or less distance from the original seat of disease. It may, however, point or open into the cæcum, into the colon, or the rectum, or in some part of the back, or in the loins just above the sacrum; or it may make its way to the hip, or the groin, and proceed even down the thigh in the direction of the large vessels. As the matter is seated behind the peritoneum, and as it generally gravitates according to the position of the body, it very rarely perforates this membrane and becomes effused into the abdominal cavity. As the purulent matter increases and presses upon, or otherwise implicates, or even inflames the larger veins, nerves, or arteries, so are the symptoms either of phlebitis, or of neuritis, or of arteritis, according to the situation and extent of the abscess, not infrequently superinduced, and complicated with the advanced progress of the disease, in addition to the primary lesion of the spine. I have repeatedly met with these complications, which have greatly aggravated the sufferings of the patient. If, during its increase, the abscess breaks externally, or is opened so as to admit the air, pus is discharged, at first without smell; but it subsequently becomes offensive, and the hectic symptoms more marked. The powers of the patient sink, and the stomach becomes irritable. In some cases the aperture either closes, and matter again collects, or it contracts, and remains fistulous for a considerable time.

6. III. DIAGNOSIS.—(a) During the formation of matter the patient suffers pain in the loins, and walking is painful. When the abscess is not large, the usual symptoms of suppuration may be absent, or so slight as to escape observation. Night or morning sweats, emaciation, and other hectic symptoms, however, generally appear or increase with the progress of the complaint. When the purulent collection has increased so as to form an external tumour either in the groin or in the loins, or near the anus, a movement may be perceived in it upon coughing. When the matter has gravitated towards the thigh or anus, the tumour is lessened by the recumbent posture. If the patient has suffered continued pain in the loins for four, five, or six months; if he has difficulty in extending the thigh, especially when putting his legs together; if he feels pain and tightness in the groin, and increase of pain on attempting to exert the limb, or when the *psosæ* muscle is either put on the stretch or exerted, then this disease should be suspected, even although no external tumour has yet appeared; but if such tumour is present, there can be little doubt of its nature.

7. (b) *Psoas* abscess, when protruding under *POUPART'S* ligament, may, as Mr. *SOUTH* observes, be mistaken for *femoral hernia*, especially as it dilates on coughing, and partly subsides when the patient lies down. But it is generally

of larger size than femoral rupture, and the fingers cannot be at all thrust around it, as they partially may behind the hernial sac. The chief distinctions, however, are the long continuance of pain in the loins previously to its appearance, the persistence of that pain, and the remarkable increase of pain produced by attempting to extend the thigh, especially backward, or the entire inability to do so. "When the abscess appears in the loins, there is no difficulty in determining its character by its history, and by its dilatation on coughing. Pulsation may sometimes be communicated to it from the adjoining large vessels;" and thus it may be mistaken for aneurism, if the history of the case and the existing symptoms be not attentively investigated.

8. (c) The diagnosis between *psosæ* abscess and disease of the hip-joint is not always, although it is frequently, easy. It has been well pointed out by Mr. *COLLSON* (*On Disease of the Hip-joint*, 4to, Lond., 1837, p. 72), and nearly as follows: 1st. In *psosæ* disease, the patient generally complains of dull or of severe pain in the loins, which is increased by the upright posture, and by every motion of the limb, particularly on extending it: in diseased hip there is no fixed pain in the loins; it is felt more in the vicinity of the hip, and especially in the knee. 2d. In the whole course of *psosæ* disease there is no deviation in the natural situation of the trochanter, and no difference in the length of both limbs; in diseased hip, on the contrary, this is always the case. 3d. In *psositis* and lumbar abscess the patient cannot turn the foot of the affected side outward without increasing the pain; in diseased hip the foot is generally turned outward. 4th. On taking a deep inspiration, on coughing, crying, and in the erect posture, the fluctuating swelling either in front of the thigh or on the nates increases, and exit of matter, if the abscess be open, is facilitated; but in abscess of the hip-joint neither phenomenon is observed.

9. IV. PROGNOSIS.—The prognosis of *psositis*, especially when the inflammation has gone on to abscess, is extremely unfavourable. Professor *COLLES* states, that not one patient out of fifty recovers from it; and that, in the course of his practice, he has not known five cases in all recover. He never knew a case get well where a surgeon interfered at all with it. In my own practice, I know only of two recoveries. For these no surgical aid was required beyond the formation of an issue in the back or loins. When *psosæ* abscess is complicated with tubercles in the lungs, or with paraplegia, or with phlebitis or neuritis, instances of such complications having occurred in my practice, the case is then hopeless. I may, however, add, that *psosæ* abscess may become complicated with hip-disease, a case of this association—the latter supervening on the former—having been under my care; or hip-disease may give rise to *psosæ* abscess, as shown by Dr. *M'DOWELL*.

10. V. TREATMENT.—This disease usually appears so insidiously, and advances so slowly, that it has proceeded in most cases beyond the influence of treatment before medical aid is required. When it is recognised at an early stage, and especially when the lesions of the vertebrae are not far advanced, or the inflamma-

tion consequent upon them has not given rise to much suppuration, then reasonable hopes may be entertained from the use of appropriate means. If the powers of the patient be not reduced, if there be no sign of anæmia, or of impaired vascular action and tone, the application of leeches, or cupping in the vicinity of the vertebral lesion, according to the state of the case, should be prescribed, and aided by stomachic aperients and cooling diaphoretics, with suitable attention to diet and perfect quietude. After sufficient local depletion, I have generally directed either of the following embrocations to be applied to the back or loins by means of flannel, and renewed once in the twenty-four hours if it be found to agree; the sensations of the patient, the state of the pulse, and a careful observation of all the symptoms guiding the physician:

No. 325. R. Linimenti camphoræ comp.; Linimenti terebinthinæ; Linim. saponis cum opio, aa, ʒj.; Olei cajuputi, ʒj. M. Fiat embrocatio.

No. 326. R. Linimenti terebinthinæ; Linimenti camphoræ comp., aa, ʒjss.; Olei olivæ, ʒij.; Olei cajuputi, ʒj. M. Fiat embrocatio.

11. If these embrocations fail, after local depletions and other constitutional or suitable means, to arrest the progress of the disease, open blisters in the vicinity of the part or issues ought to be ordered, and kept freely discharging; while an alterative and restorative influence should be exerted on the constitution by a course either of the iodide of iron with sarsaparilla, or of the iodide of potassium and liquor potassæ, with compound tincture of bark and fluid extract of sarsa; or of the bichloride of mercury, in either the compound tincture or decoction of cinchona. I have alternated short courses of these, varying them according to circumstances, during the operation of the applications, issues, &c., advised to be applied near the diseased vertebræ, and often with marked benefit. I have prescribed iodine for this disease since 1822.

12. Several surgical writers, even ABERNETHY, COOPER, DUPUYTREN, LAWRENCE, PEARSON, CHELUS, SOUTH, and others, have directed their attention and their treatment chiefly to the consecutive abscess. But if the abscess be not large, if it be not complicated with paraplegia, or if it occasion no distressing symptoms, as it sometimes does, by its pressure on nervous, venous, or arterial trunks, or large branches, it should not be officiously interfered with; the external drains, &c., placed near the diseased vertebræ, the constitutional means prescribed above (§ 11), and such other aids as stomachic aperients, &c., as the peculiarities of the case may require, being the remedies most deserving of confidence. If these means succeed in even partially removing the spinal disease, the consecutive abscess, if not large, will either diminish or become absorbed, at least in some instances, as in two of those which have come under my care, and for which the above treatment, without opening the abscess, was pursued. In one of these cases the treatment sometimes consisted, during the intervals between courses of the above medicines (§ 11), chiefly of full and regular doses of either morphia or opium, which also were occasionally given with these medicines.

13. When the inflammation terminates in suppuration, and an abscess is formed, ONE-

LIUS remarks, that the absorption of the matter may be procured in some cases, although rarely, by issues or perpetual blisters in the loins, and by general treatment, which promotes the abdominal functions and the patient's strength. DUPUYTREN observes, that these abscesses may remain for years, and the pus either be absorbed, no trace of them remaining, or, after a time, they may increase, the skin covering them becoming inflamed and giving way. In rare instances, the pus may drain away and not be reproduced, or, after a longer or shorter time, it may be converted into adipocerosus matter. These, however, are favourable terminations of rare occurrence. Much more frequently the abscess goes on increasing, either until it inflames and bursts the skin at the most prominent point, or until it opens into one of the hollow viscera, or until the distressing effects produced by it, as already adverted to, create a necessity for opening it.

14. Mr. SOUTH observes, that issues are most important aids in the treatment of psoas abscess, either before or after it has opened of itself or been punctured, and that no circumstance should prevent a recourse to them. He advises the issue to be made on the side of the spine opposite to that where the abscess is seated. If presenting in one of the lumbar regions, the issue should be made at the outer margin of the quadratus lumborum of the opposite side; but if there be abscess in both lumbar regions, issues ought to be placed above and below them. If the swelling appear at the top of the thigh, an issue may be made on the same side, or in both sides of the spine, but never over the spine, nor over the abscess itself, for very obvious reasons. The issue should be made the size of a sixpence, with caustic potash, and it will generally enlarge to that of a shilling: one, or both, should be kept freely open and discharging, as just advised, while the constitutional and restorative powers ought to be promoted by the means recommended above.

15. Much difference of opinion exists as to the propriety of opening psoas or lumbar abscess, or of waiting for the self-evacuation of it. My own observation leads me to state, that there are cases for which surgical interference is either unnecessary or injurious; while there are others for which it may be most beneficially employed, if not for a cure, at least for the alleviation of the sufferings of the patient, and prolongation of life. When required, the opening should be made, as advised by Mr. ABERNETHY, so as entirely to prevent the entrance of air through the aperture, otherwise inflammation of the sac, increased hectic, offensive discharge, and sinking of the powers of life will ensue. An opening thus carefully made, and subsequently managed as carefully, will often prevent those painful complications observed in the advanced course of the malady, and to which surgeons have not sufficiently adverted. The occasional inflammation and erosion of vessels adjoining the purulent collection, and the distressing symptoms which result, as well as the not unusual implication of a nervous trunk, or of some other important part, may be prevented, or even alleviated after their appearance, by opening the abscess before it has become so greatly distended as to complicate the case and increase the sufferings

of the patient. Mr. South has given a good digest of surgical opinions on this topic, with his own advice, and to his translation of Celsus's system of surgery I refer the reader respecting it. I should, however, add that, whether the abscess be opened or not, the issues and constitutional treatment I have recommended, with opium and other aids, and alternated, modified, or changed, as circumstances may require, ought to be persisted in throughout the disease.

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PSORIASIS AND LEPRIASIS.—SYNON.

PSORIASIS, Ψωρίασις (from ψωρα, scabies, itch); *Impetigo*, *Scabies*, Celsus. *Impetigo*, Sennert, Plenck. *Scabies sicca*, Plater, Hoffman. *Psoriasis*, Vogel, Swediaur, Willan, Bateman. *Lepidosis psoriasis*, Young, Good. *Dartre*, *Dartre furfuracée*, Fr. *Kleinaussatz*, Germ. *Dry Tetter*, *Dry Scall*.

LEPRIASIS, Λεπρία, Λεπρία (from λεπρός, scaly, rough). *Leuce*, *Alphos*, *Impetigo*, *Vitiligo*, Celsus. *Impetigo excorticata*, Avicenna. *Lepria*, Sauvages, Sagar, Cullen, Willan, Young, &c. *Lepidosis lepriasis*, Good. *Lipre*, Fr. *Dartre squameuse*, Alibert. *Aussatz*, Germ. *Scaly Leprosy*, *Leprous Scall*.

CLASSIF.—4. Class, 8. Order (CULLEN).

6. Class, 3. Order (Good). ii. Order.

2. Genus (Willan and Bateman). III.

CLASS, I. ORDER (Author).

1. DEFIN.—A chronic inflammation of the skin, either limited to a particular region or extended more or less over the surface, appearing first with slight elevations, which change into scaly patches; the patches of psoriasis being of different sizes, not depressed in the centres, but with irregular and very slightly raised edges; those of Lepriasis being generally rounded, slightly depressed in the centres, and surrounded by slightly raised and reddish circles.

2. Both *Psoriasis* and *Lepriasis* or *Lepria* were considered as modifications of the same disease by most of the ancients, and they are treated of by PAULUS ÆGINETA by the terms "*Leprosy* and *Psora*." He states that "both these affections consist of an asperity of the skin, with pruritus or wasting of the body, having their origin from a melancholic humour. But leprosy spreads over the skin more deeply in a circular form, throwing out scales which

resemble those of fishes; but psora is more superficial and variously figured, and throws out furfuraceous bodies." (*Translated by* ADAMS, vol. ii., p. 15.) Mr. ADAMS concludes his remarks respecting the views of the ancients as to these affections as follows: "It will be remarked that the Leuce of the Greeks, the leuce and fourth species of impetigo of CELSUS, and the albarras of most of the Arabians, are the same as the *lepra vulgaris* of Drs. WILLAN and BATEMAN; that the alphos of most of the Greek authorities and of CELSUS, and the morphia alba of most of the Arabians, correspond with the *lepra alphoides* of our English nosologists; that the melas, alphos niger, and common lepra of the Greeks, CELSUS's third species of impetigo and his melas, and the morphia nigra and impetigo of most of the Arabian translators, apply to the *lepra nigricans* of our modern arrangement; and that the psora of the Greeks, CELSUS's second species of impetigo, and the scabies of OCTAVIUS HORATIANUS, and of most of the Arabian translators, comprehend both the *psoriasis* and *scabies* of WILLAN and BATEMAN. Since many of the ancient authorities speak of scabies as being infectious, they must have applied the term to the true itch, with which it is not likely, as RAYER maintains, that they were wholly unacquainted. The earlier modern writers, as those of the Schola Salernitana, PLATERIUS, GUY OF CAULIAU, and LANFRANCUS, jumble together the Latin and Arabian names, so as to produce no ordinary degree of confusion." (*Op. cit.*, vol. ii., p. 21.)

3. I. CAUSES.—The causes of the several varieties of both *Psoriasis* and *Lepriasis* are the same, or the same causes are common to both these species.—A. The predisposing causes are chiefly hereditary conformation, the melancholic temperament, and an habitual languor and weakness of the circulation in the integuments, with dryness of the skin. These affections occur at all ages and in both sexes, but somewhat more frequently in adults and in those advanced in life. The influence of sex is not great, some writers stating that they are more frequent in females, others in males. They are both constitutional maladies, and are often connected with disordered abdominal functions, both at their origin and in their course. They are sometimes connected with the gouty and rheumatic diathesis, and they may appear at any season, but more frequently in spring and autumn: lepriasis oftener in autumn. Prolonged or neglected dyspepsia; inattention to the states of the bowels and of the intestinal secretions and excretions; the habitual retention or accumulation of fecal matters, improper and insufficient food; mental anxieties, and sexual excesses also predispose to these eruptions.

4. B. The occasional exciting causes are the use of salted, dried, smoked, or otherwise preserved meats and fish; the frequent use of shell-fish; irregularities and improprieties of diet, the use of pork or the flesh of the wild boar, bacon, hams, &c.; drinking cold fluids when the body is perspiring; vicissitudes of temperature and weather; poor, innutritious, or unwholesome food; exposure to cold or moisture, and living in low, damp cellars or localities; prolonged anxiety of mind; the frequent use of heating and stimulating food, sau-

ces, spices, condiments, pickles, preserves, acids, or spirituous liquors; debaucheries or excesses of any kind; the want of sufficient personal cleanliness; and the irritation produced by various substances employed in several of the useful arts.

5. The *contagious* or *non-contagious* nature of these eruptions has long been a topic of dispute, especially as they appear in countries bordering upon the Mediterranean Sea. My friend and colleague, Mr. DENDY, has considered the subject very fully in his unpublished work on these maladies, which he kindly allowed me to peruse; and concludes that in this country they are not contagious. WILLAN has observed that *psoriasis guttata* and *annulata* affect several children about the same time in large families and schools, especially those who sleep together; and the same remark is made by Mr. E. WILSON and others. The simulation of contagion must, however, arise from the constitutional predisposition to these eruptions undoubtedly existing in some families, and from the simultaneous operation of the same exciting causes. The topic, however, deserves farther investigation.

6. I have observed these eruptions more frequently in unmarried than in married females. They are often dependent upon impaired digestion and assimilation, and upon equally impaired function of the skin, kidneys, and intestinal canal, the blood thereby abounding in imperfectly assimilated chyle and in effete materials. I have seldom observed them in females whose catamenial discharges were quite regular and sufficient, these discharges, when healthy, being manifestly depurative as respects the circulation, and no mean preventive of chronic cutaneous eruptions. Many modern pathologists have viewed both *psoriasis* and *lepriasis* as symptomatic of gastro-intestinal irritation. That there is more or less disorder of the digestive canal in most cases of both these eruptions must be admitted; but it does not strictly follow that this disorder consists of inflammatory irritation. It is generally functional merely—a defect of function as much as disorder of function, the digestive and assimilative derangement and the cutaneous affection proceeding from the same source, viz., impaired organic nervous power, the cutaneous disorder only being the last of the series of functional and morbid changes.

7. Every arrangement of the scaly eruptions must necessarily be, to a certain extent, conventional, and be based on the more prominent phenomena and differences which they present. The chief points of difference have thus become the most familiar, as being the most commonly noted and represented, while the gradations by which the one variety and species pass into the other are so far kept out of view as to be either overlooked or unacknowledged. That this is the case more especially with the three species of scaly eruptions to which the terms of *pityriasis*, *psoriasis*, and *lepra* have been applied is not to be doubted by any one whose knowledge of them has been acquired from observation, and not from writers who have been more anxious to create distinctions than to trace resemblances. That these three species of eruption do not merely present points of resemblance in most cases, and even of identity

in others, but also originate in the same or similar causes, will be farther admitted. Nor are their causes only the same, their constitutional nature, their associations, and their tendencies are also the same or closely similar. Still, it becomes necessary to describe those differences which may be remarked in their external characters, and which enable us to recognise as well as to classify them. The intimate connexion subsisting between these eruptions is shown by the circumstance of their presenting, in some cases, the distinct features of *psoriasis* in one part, and in another part those of *lepriasis*; and it occasionally happens that *pityriasis* of very long duration, or the acute or inflammatory form of that species, when it becomes very chronic, assumes the form either of *psoriasis* or of *lepra*, while *lepra* of long duration often passes into the form of *psoriasis* inveterata. The three species of eruption, moreover, require the same constitutional and local treatment. For these and other reasons mentioned when treating of *tubercular leprosy*, or the *leprosy* of the Arabians and Middle Ages (*see art. LEPROSY*), I have viewed *lepra* as merely a species belonging to the same genus as *psoriasis* and *pityriasis*; and have treated of *psoriasis* and *lepra* in connexion, their causes, pathology, and treatment being the same.*

* My colleague, Mr. DENDY, whose experience in the treatment of these eruptions is very great, has endeavoured to clear up the confusion, existing even down to the present day, respecting squamous diseases. He has arranged *psoriasis*, *lepra*, and the inflammatory form of *pityriasis* as species constituting one genus, "*Lepriasis*," and has assigned to each species what he considers its *synonyme* in ancient and modern authorities. His views, as well as his descriptions, are most deserving attention. I give his arrangement, but I take the liberty of placing his species, "*Lepriasis furfurans*," or acute *pityriasis*, before the other more chronic and severe species, consisting of *psoriasis* and *lepra*.

LEPRIASIS.—SYNON. Zarab, II.—Kouba, Kuba, Al-kauba, Ar.—Αεμπά, Gr.—*Lepra*, W.—*Lepidosis lepriasis*, G.—*Scale-skin*, *Leprosy*, *Scaly Leprosy*.

SPEC. I. LEPRIASIS FURFURANS.—SYNON. Aharati, Ar.—Tinea, Porrigo, Dartre furfuracee, Al.—Teigne amiantacee; Pityriasis, W.—*Pityriasis acuta*, R.

SPEC. II. LEPRIASIS GUTTATA.—SYNON. Αλφος, Gr.—*Alphos*, C.—*Lepra alphoides*; *Psoriasis guttata*, W.—*Dartre squameuse orbiculaire*, Al.—*Lepriasis albidæ*, G.—*Psoriasis discreta*, R.—*Guttated dry scall*. *Spotted leprosy*.

SPEC. III. LEPRIASIS ANNULATA.—SYNON. Boak; Behag, II.—Bahak, Bothor, Ar. (*Translated pearly or dull white leprosy*).—Αεμπά, Gr.—*Lepra Græcorum, vitiligo*, C.—*Lepra Vulgaris*, W.—*Dartre squameuse arrondie*, Al.—*Psoriasis circinnatus*; *Lepidosis lepriasis*, G.—*Lepra*; *Leprosy*; *Greek leprosy*.

VAR.—*Centrifugal*; *Crescentic*; *Gyrated*.

SPEC. IV.—LEPRIASIS DIFFUSA.—SYNON. Saphat, II. (*Translated spreading dry scall*).—Sahafati, Ar.—*Ψαλαλπιωδης*, Gr.—*Scabies, sicca*, S. Crassa, Itch.—*Psoriasis diffusa*, W.—*Psoriasis confluent*, R.—*Lepidosis Psoriasis*, G.—*Dry scall*; *Scaly tetter*.

VAR.—*Confluent*, &c.

SPEC. V. LEPRIASIS INVETERATA.—SYNON. Bahereth le-bena, II. (*Translated plague of leprosy*).—Beras begas, Ar.—Αευρη, Gr.—*Agria*.—*Bright white leprosy*.—*Lichen agrius*.—Pallagra, Ar.—*Acroynia*.—*Psoriasis inveterata*, W.—*Dartre squameuse invetere*; *Lichenoides*, Al.—*Lepriasis Candida*, G.—*Inveterate dry scall*.

VAR.—*Scabida*; *Indurata*; *Prominens*.

SPEC. VI. LEPRIASIS LIVIDA.—SYNON. Bahereth cecha, II.—*vaupar*, Gr.—*Beras asved*, Ar.—*Melas*, C.—*Lepra nigricans*, W.—*Lepriasis nigricans*, G.—*Black albaras*.—*Black morphia*.—*Dusky or black leprosy*.

SPEC. VII. LEPRIASIS SYPHILITICA. SYNON.—*Lepra Syphilitica*, *Psoriasis Syphilitica*, W.—*Syphilitide pustuleuse*, Al.—*Syphilitides*, R.—*Syphilitic lepra* and *psoriasis*.—*Scaly syphilis*.

¹ The capital letters following the synonyms represent the authorities. Al. Alibert.—Ar. Arabians.—C. Celsus.—G. Good.—Gr. Greeks.—II. Hebrews.—R. Rayer.—W. Willan.

8. II. DESCRIPTION.—i. PSORIASIS GUTTATA.—SYNON. *Lepra alphoides*; *Lepriasis albidula*, Good. *Psoriasis discreta*, Rayer. *Dartre squameuse orbiculaire*, Alibert. *Lepriasis guttata*, Dendy. *Guttated dry scall*.—Psoriasis, even in this the mildest of its forms, is often preceded or attended by symptoms of indigestion, lassitude, and inaptitude for physical or mental exertion; but these are often so slight as to be overlooked. In this variety numbers of small, distinct elevations or papulæ occur, sometimes appearing at first of the size of a pin's head, their summits soon becoming covered with a minute scale of a dull white colour. These elevations are generally, at first, from two to three or four lines in diameter, irregularly circumscribed, and generally rounded. They increase somewhat in size, but always remain distinct, with the skin sound between them. When freed from the squamæ on their surfaces, they appear red and irritable, forming rounded spots or patches, from two to four or five lines across; and are slightly prominent, and of a brownish red hue. These patches occasionally heal, like those of lepra, from the centre to the circumference; and in this case they present slight depressions in the centres, and acquire a yellowish dusky tint. The scales formed on their surface are reproduced as soon as they are removed. As they decline, the patches often are transformed into segments or arcs of circles; and when quite removed the skin presents small stains of a grayish brown or yellowish hue in the spots occupied by them.

9. This variety is seldom accompanied with much pruritus, unless when the body is heated by exercise, or by stimulating or heating food and drink. It may be confined to the hairy scalp, face, trunk, or extremities; or be disseminated over these regions, appearing either at once upon all of them, or upon each in succession. The patches or spots are generally irregularly disseminated, being crowded in one situation, and thinly scattered in others; but they are more numerous in the line of extension in the extremities than in that of flexion. Guttated psoriasis appears most frequently in spring and autumn, and often disappears in summer or in winter. It may thus recur for many successive years. It is not infrequent in children, and is more quickly evolved in them, often with slight fever. It is more prevalent in adults than in children and old persons. It often presents characters intermediate between psoriasis and lepra. It sometimes coexists with one of the other forms of psoriasis, and I have seen it associated with pityriasis. When it affects the fingers, it often implicates the nails.

10. ii. PSORIASIS DIFFUSA.—SYNON. *Psoriasis confluent*, Rayer. *Lepidosi psoriasis*, Good. *Lepriasis diffusa*, Dendy. *Spreading dry scall*; *scally tetter*.—a. In this variety the patches are of large size, of variable extent, and irregular form. They are developed either by a number of small elevations, like the preceding variety, which run together and form one continuous patch, or by a papular roughness of a patch of the epidermis and congestion of the subjacent dermis, or by several patches, which speedily increase in size and coalesce. In each of these modes the patches may require two or three weeks to be fully formed. The surface of each is usually then of a dull red colour, rough, and

slightly elevated above the surrounding skin, intersected by furrows which correspond with those of the epidermis, and often fissured by several deep chaps. The patches are covered by numerous thin epidermic scales, the removal of which is rarely followed by any fluid exudation. The eruption often assumes the characters of the guttated or discrete variety over different parts of the body, and the diffused form around the joints and extremities.

11. Diffuse psoriasis may occur in a single patch, of various sizes, or in several and upon any part of the body; but most frequently on the fore-arms, or about the elbow and wrist, and, unlike lepra, chiefly the fleshy parts of the limbs. Its duration is always chronic; even its mildest states may continue for weeks or months, and the severest forms may remain for months or years.

12. Diffuse psoriasis, when extensive, is often preceded by symptoms of constitutional disorder; especially indigestion, costiveness, languor, and debility, which frequently subside as the eruption is developed, but which often recur. The eruption is generally attended by slight pruritus, and by pain and tenderness after the removal of the scales, or when the patches are fissured or chapped. It occurs chiefly in adults and the middle-aged.

13. b. This variety has, in rare instances, assumed a *gyrated form*—*Psoriasis gyrate*, or that of narrow bands, or curved or tortuous lines. Biett describes it as long, narrow, tortuous stripes, resembling worms; and sometimes bending into rings, occurring generally on the back, or trunk of the body. These stripes are covered by very delicate epidermic scales, which exfoliate, and are reproduced as in the other forms of this variety. They are attended by a slight pruritus, and but little inconvenience. In very rare cases the eruption assumes an *annular form*, especially about the neck and face of delicate persons, and is very slight.

14. c. In children, diffuse psoriasis is occasionally seen in a sub-acute form—*Psoriasis infantilis*, WILLAN. It appears from two or three months to two or three years of age. It is more acute, is attended by more pruritus and smarting, and is much more rapid in its progress than in adults. The surface of the patches, which are often large, is intersected by numerous fissures or chaps, and often excoriated by friction; the excoriations exuding an ichorous fluid, which dries into hard scabs of considerable size. In infants and children this eruption may be attended by phlyzacious pustules, by a morbid secretion from the nostrils, by loss of the hair of the eyebrows and the eyelashes when the forehead is affected, and by hardened elevations of a reddish hue.

15. iii. PSORIASIS INVETERATA.—SYNON. *Lepriasis candida*, Good. *Dartre Squameuse lichenoïde*, Alibert. *Lepriasis inveterata*, Dendy. *Inveterate dry scall*.—When either discrete or confluent psoriasis has continued months, or years, or sometimes after the more inflammatory form of pityriasis has persisted long, especially when the eruption is hereditary, or occurs at an advanced age, or attacks a debilitated or shattered constitution, or is consequent upon protracted functional disorder of the digestive organs, then the eruption assumes the

form thus named. It may be regarded as an aggravated form of psoriasis diffusa. Inveterate psoriasis usually extends over a large surface, occupying the most of the limbs, and of the trunk; the face, the palms of the hands, and the soles of the feet being free. The skin is thickened, congested, hot, dry, and harsh. It is stiff, fissured by deep cracks, and covered by epidermic scales and scabs, which are thrown off in great abundance. Pruritus is very troublesome in this variety, and is increased by the heat of bed and by a heating regimen. The thickening of the integuments restrains the motions of the limbs and flexions of the joints. When the surface is abraded or excoriated by friction or otherwise, a fluid exudes which concretes into scabs. When this eruption affects the scalp, the scales collect in numbers; and when they are removed, an ichorous fetid exudation takes place from the reddened surface. When it extends to the hands, the nails are remarkably affected; but in some cases I have observed the affection of the nails without the fingers being otherwise implicated, and have imputed the disease of the nails to the infection of the fluid exuded from the surface scratched by them. The constitutional disturbance may be but slight even in the severest cases, particularly in respect of febrile symptoms. But the functions of the stomach, liver, and bowels are often languid and torpid, and the several depurating actions impaired. The duration of this variety is always prolonged and indeterminate. In old persons it continues for the rest of life.

16. LOCAL STATES OF PSORIASIS.—(a) Psoriasis may occur primarily on the *hairy scalp*; but it is more frequently consequent upon the eruption in some other part, or upon neglected pityriasis. It is oftener seen in the *distinct* form; much more rarely in the *confluent*. In rare instances it has extended over nearly all the scalp, extending to the forehead in a line parallel with that of the hair. The inflammation sometimes attacks the bulbs of the hair, which become detached in the patches affected.

17. (b) *The face* is rarely affected alone, the eruption generally appearing also in some other part. The patches on the face are usually red and furfuraceous, the scales being light and thin. On the *eyebrows* and *eyelids* it appears, as everywhere else, by the formation of papulæ. The eyelids become stiff, and slightly fissured or chapped, and these changes are followed in children by the loss of the ciliæ and the hair of the eyebrows. It rarely affects the *lips*, as true psoriasis, but generally in a form that more strictly belongs to pityriasis.

18. (c) *Psoriasis genitalium* is not infrequent, and either the *prepuce*, or the *scrotum*, or the *labia majora vulvæ* may be the seat of the eruption. In either of these situations it presents the characters already described. It seldom appears in any of these primarily, but generally in connexion with its occurrence in other situations. It may, however, be consequent upon prurigo or pruritus of these parts. In the *prepuce* this eruption is often obstinate and severe, and is sometimes attended by thickening, painful exudations of blood and fissures, and phymosis. Psoriasis in this situation may be associated with psoriasis of the *scrotum*, which is often most obstinate, and assumes the invet-

erate form, or with *psoriasis palmaris*. As respects the characters of the eruption, there are no differences produced by these localities. But swellings of the inguinal glands are often caused by the appearance of the eruption in these situations; and care should be taken not to confound it with venereal affections.

19. (d) *Palmar psoriasis*—*Psoriasis palmaris*—may be either distinct or confluent; but in either form the elevations are generally broad, of a pale reddish hue, and the seat of much heat and itching. If the elevations are numerous they become painful, and interfere with the patient's occupations. In the confluent form the palm of the hand swells, and presents a uniform brownish red colour. As the eruption becomes more chronic, the heat and itching are less troublesome, the cuticle covering the elevations grows thicker, acquires a yellowish hue, dries up and becomes friable, and at last of a dead white on the surface of the patches. The epidermis then cracks, and is detached either spontaneously or by the nails of the patient, and leaves a new epidermis, through which the corion appears red and vascular. The epidermis surrounding the diseased patch also undergoes a change, being thicker than usual, of a dirty yellow tint, and subsequently becoming dry or mealy on the surface. It finally exfoliates irregularly, at first adjoining the older patches, and then in the flexures of the joints and natural folds of the palm. The desquamation is always *irregular*, and very different in appearance from that of the next variety, the *psoriasis palmaris centrifuga*; but, like it, and even more constantly, is attended by linear fissures, which penetrate to the quick in the lines of the palms, and by smaller cracks or fissures which extend less deeply.

20. (e) *Centrifugal palmar psoriasis* is less common than the preceding. It begins in the palm by a single elevated spot, solid, and of small size, upon which a small white scale is formed. Around this elevation a series of red eccentric circles are produced, each in succession, and are covered by epidermic scales, which exfoliate. As these circles appear, each successive one is more eccentric, until the whole palm is implicated, and each undergoes desquamation. Squamous patches also appear on the palmar aspects of the fingers. The palmar integument is reddish where the exfoliation of the scales has taken place, is thickened, and fissured by numerous chaps, some of which, upon opening the hand, which is painful and stiff, sometimes exude a little blood.

21. Both these forms of palmar psoriasis are of long duration, they seldom continuing for a shorter time than several months, and often persisting for years. They often decline in summer and autumn, and are exacerbated in winter and spring, for a number of years. Palmar psoriasis is sometimes complicated with *psoriasis genitalium* in either sex. A modification of it sometimes affects, although much less frequently, the soles of the feet—*psoriasis plantaris*; but the severity of the symptoms is less in this situation, owing probably to the structure of the plantar integument, and to the protective coverings of the part. Fissures in this situation are much less apt to occur, and are smaller when they occur.

22. (f) A variety of *psoriasis diffusa* occa-

sionally affects the backs of the hands, and is called *grocers' itch*, because it is often seen in persons engaged in this trade; but it also often attacks bakers, laundresses, and others. It begins with two or three squamous elevations, which often spread until the whole back of the hand is covered. The integument at length presents numerous dry and painful fissures over or near the wrist and the articulations of the metacarpal bones and first phalanges of the fingers. This variety is distinguished from confluent and chronic *lichen* of this part by the circumstance of the latter always commencing in an eruption of small papulæ.

23. (g) *Psoriasis of the Nails*.—*Psoriasis Unguium*.—When the disease affects either the upper or the lower extremities, the nails are often attacked, even although neither the fingers nor the toes may be affected. But the affection of the nails never occurs without some other part being attacked. It is most frequently associated with *psoriasis guttata* of the hands or arms. The nails, when diseased, become yellowish or tawny; thickened and irregular in their structure; rough, ragged, and brittle, and often bent over the ends of the fingers. A cheesy-like matter is sometimes formed at the roots of the nails, or between the roots and the matrix, as at the extremity of the papillary surface, these parts sometimes becoming unusually vascular, and giving rise to thickening, &c.

24. (h) *Psoriasis* is often complicated with visceral disorder, as already noticed, and sometimes with *lepra* or *pityriasis*. It has also been seen associated, especially in children, with *eczema impetiginodes*, vesicles and purulent points appearing amid the thin squamæ covering the patches of psoriasis. At a later period these patches become excoriated, and form thin, lamellar, yellowish scabs like those of *eczema*. This association is not infrequent in children during the period of teething, and occasionally at a more advanced period.

25. iv. PSORIASIS LEPRÆFORMIS. — SYNON. *Lepra*; *Lepriasis*. *Lepra Græcorum*, Auct. *Lepra vulgaris*, Willan. *Psoriasis circinnatus*; *Lepidosis lepriasis*, Good. *Lepriasis annulata*, Dendy. *Psoriasis orbicularis*; *Dartre Squameuse arrondie*, Alibert. *Scaly leprosy*; *Greek leprosy*.—This chronic squamous eruption is characterized chiefly by its consisting of circular and slightly-raised patches, which are speedily covered by thin, semi-transparent, epidermic scales, the patches being prominent at their edges, and somewhat depressed in their centres, and the scales being thrown off and replaced by successive formations. *Lepra* is occasionally confined to the knees and elbows, and it generally appears first in these situations, or, rather, immediately below them. In most cases it affects both legs or both arms at the same time. It is apt to extend by the successive formation of new scaly patches along the arms and thighs, to the breast and shoulders, and to the lumbar and lateral regions of the abdomen. The patches are sometimes more numerous, large, and prominent on the lower part of the trunk. The disease rarely extends to the hands or hairy scalp. The patches which appear on the head are usually of a small size. They are seen near the outer angles of the orbits, whence they spread along the eyebrows to the forehead and temples. When *lepra* extends

to the hands or fingers, the nails and the matrices of the nails are often affected in a similar manner to that described above (§ 23). Everywhere the patches are apt to coalesce by their corresponding edges; but the originally orbicular form of the aggregate patches is partially preserved in the arcs of circles which are seen in the circumference.

26. A. *Lepra vulgaris* commences with small, smooth, solid elevations of a dull red hue, around which numbers of other reddish, prominent spots, about a line in diameter, are evolved. The surface of the elevations become covered in two or three days with thin whitish scales. In four or five days the elevations spread, having thrown off the small spangle-like scale from their summits, and are attended by a sense of heat, tingling, or pruritus. They then enlarge rapidly by the extension of their circumference, which is raised and red; while the centres become depressed and paler than the margins. As the scales exfoliate others are produced, and are of a glistening or opalescent, or of a pearl-gray or pale yellow tint. The squamæ are not evenly spread over the surface of the patches, and they are detached partially and irregularly. After their fall, the skin which they covered looks red, shining, and somewhat raised. They are superposed, especially in the circumference of the patches, and thus become thicker and thicker, so as to form prominent layers. Even when small, the patches are never covered by a single scale. When they are recent, the corion does not present lines corresponding to those of the cuticle, but when they are older such lines are observed, and are often increased to wrinkles, which correspond with small indentations or ridges in the inner surfaces of the scales. However detached from the inflamed surface, a fresh formation of scales takes place.

27. The cure of the orbicular patches of *lepra* begins in the centres, and extends to the circumference. After the detachment of the squamæ the skin acquires, when they are not renewed, a grayish tint, with a shade of yellow. At a later period, the ring bounding the patches is narrowed progressively from within outward; the circle at last is broken in one or more places, and the spot ultimately disappears entirely. (RAYER.)

28. *Lepra* is seldom attended by any febrile disturbance, or other disorder than impaired digestion, assimilation, and excretion. The appetite is usually good, and generally greater than the powers of digestion. It occasions no farther inconvenience than slight itching upon getting into bed, or upon changes of temperature. But when the patches are extensive or numerous, or when the inflammation of them is increased by a heating regimen, the patient feels so much burning or stinging pruritus as often to disturb repose. When the patches surround the joints they cause stiffness, and occasionally are attended by small painful fissures. The disease is always of considerable duration; it often continues for years, sometimes for life. I am now attending a lady who has been afflicted with it extensively for upward of forty years, although she has always had the advantage of the best medical advice.

29. B. The variety denominated *Lepra alphoides* by WILLAN is merely a milder form

than the preceding, the squamous patches remaining of small size, and seldom exceeding a few lines in diameter. The spots increase slowly, are slightly prominent, and rarely run into one another. They form almost exclusively on the joints and extremities, and differ from the patches of *lepra vulgaris* chiefly in the small size and whiteness of the scales which are formed. They are commonly met with in children and delicate persons, and are not easily distinguished from *psoriasis guttata*. Several other modifications are sometimes observed in the form, disposition, and extension of the patches, depending upon their seat and the constitution of the patient; but these are too numerous to describe. Some of them so closely resemble *psoriasis* as hardly to be distinguished from it. When this variety affects the scalp or pubic region, it often occasions much pruritus or inconvenience; but it rarely affects these situations exclusively. The squamæ in these situations are generally yellow and furfuraceous, and are without the glistening micaceous hue they present on the knees or elbows.

30. *C. Lepra nigricans* is a comparatively rare form of lepra, and is met with only in cachectic and broken-down constitutions. The form and distribution of the patches are the same as described; but the patches are not so large, and are generally without the central depression. Instead of being of dull red or rose-colour, they are of a livid or bluish brown hue. Mr. E. Wilson states that the scales are so thin as to allow the lividity of the surface to be seen through them, are easily detached, and leave behind a tender and frequently an excoriated surface, from which a morbid serous fluid, often mixed with blood, is poured out. This exudation hardens into an irregular and friable crust. This variety is particularly annoying when it affects the scalp. It occurs chiefly in persons whose occupations expose them to the vicissitudes of the weather, and to a precarious diet, with fatigue and watching, and excesses in spirituous liquors, &c.

31. V. PSORIASIS ET LEPRIASIS SYPHILITICA. —SYNON. *Squamæ Syphiliticae*. —*Lepra Syphilitica*, *Psoriasis Syphilitica*, Willan. *Syphilide pustulose*, Alibert. *Syphilides Squammeuses*, Rayer. *Lepriasis Syphilitica*, Dendy. *Scaly Syphilis*. —*Secondary syphilis* assumes every species and variety of cutaneous eruption; and no species more frequently than *psoriasis* and *lepriasis* in all their forms. Mr. Dendy states, that the most common form of scaly syphilis is that of irregularly scattered spots, which, however, become occasionally confluent, and sometimes three or four forms or distributions of scale are seen in the same subject, viz.: *foliaceous luninae* on the scalp, *guttated* and *diffused psoriasis* with indurated scales on parts subject to pressure, heat, or friction, as the palms, soles, axillæ, scrotum, and labia vulvæ; *psoriasis lepraformis*, or *lepra*, on the breast, abdomen, and thighs; and very rarely an extensive *psoriasis diffusa*, as a syphilitic eruption.

32. *A. Psoriasis guttata syphilitica* commences in a copper-coloured, livid, or violet spot, at first extremely small, usually becoming from six to eight lines in diameter, and, when extending to the scalp, assuming a greenish olive or dull yellowish hue. The spot is flatter, softer, and

smoother than the incipient papulæ of common *psoriasis*, and less squamous, having little or no defined edge; or it may be sometimes larger or redder, more defined, and less squamous. The spots or patches are often more ovoid than circular; the diseased cuticle on their surface is usually more furfuraceous, still adhering tenaciously, and it is of a dull violet or yellowish hue, rather than white. When the scales are detached they are of dirty pearl gray, the livid colour being imparted by the subjacent tissue. After one or two exfoliations the squamous character often diminishes, and, under mercurial influence, disappears in three or four months. If a syphilitic treatment fail, they will degenerate, the squamous character changing to that of a blotch, or even to superficial ulceration. In some cases, Mr. Dendy remarks, that in the centre of the scale a sort of pustular or ulcerated character is observable, even in an early stage, very similar to the moist crusts of *eczema*. This is never seen in the common forms of the non-syphilitic eruption.

33. *B. Another form of scaly syphilis* is that of a *dusky or brownish, livid, circular spot*, the centre slightly fissured and foliaceous, the cuticle detached, as it were, around the disk, and thus forming a white margin. This form nearly resembles *ecthyma syphilitica*. (*See art. ECTHYMA*, § 6.) In both these forms of syphilitic scales, ulceration of the throat is often also observed.

34. *C. The annular syphilitic scale*, or syphilitic *lepra*, is less defined than the common circular *lepriasis*; the margins are slightly raised, the scales are dusky rather than white, and more annular. "In some cases the guttated and annular forms become one elevated, brownish, red mass, here and there spotted with scales."—(DENDY.)

35. *D. Syphilitic scaly spots* usually appear from five to ten weeks after the subsidence of a chancre. "Mr. CARMICHAEL believed it to be the sequence only of that ulcer which was marked by indurated edges—the true Hunterian chancre." Mr. Dendy does not think that it is thus limited, for he has seen it consequent upon primary pustules which had speedily subsided, and both consequent upon and coexistent with almost every primary form of the syphilitic malady.

36. The most common seat of scaly syphilis is on the forehead, "*corona veneris*," and the breast. When, however, the patches speedily arise during acute or often-recurring primary disease, especially in depraved constitutions, they often appear first in the vicinity of the organs of generation, and are then more defined. The character of the patches or spots is, however, much altered by the treatment, especially by external applications.

37. The spots of simple lepra are generally larger and rounder than those of syphilitic origin, the latter being much more rarely confluent and united into broad bands and patches than those of the former. Scaly syphilis is, however, much modified by locality. When it is seated in the axilla, or between the toes, it is moist, whitish, and very offensively fetid. Sometimes, also, fissures form, and the cuticle peels rather than drops off. On the scalp it assumes a greenish livid hue. On the palms and soles it is usually guttated. The spots,

however, are not so distinct as in other parts, the cuticle, on being detached, also appearing more horny and yellowish; and in this situation exfoliation is often very protracted. If fissures form, and the feet and hands are subject to much pressure, they become deeply ulcerated. If the matrix of the nails become affected, painful or phagedenic onyxia may follow. (DENBY.)

38. *E. Infantile scaly syphilis* is almost invariably marked by *snuffling* from the child's birth. The skin is of a dirty yellow or waxen hue, with numerous brownish pink spots, presenting a sprinkling of a gray or brownish white dust, which is often most abundant on the circumference of these spots. The disease may resemble, also, the livid spots already described, even at a very early age; but more frequently an association of these differently tinted spots are observed on the face and hands.

39. III. DIAGNOSIS.—The differences between the species of scaly eruption have often been exaggerated, or the extreme points of difference have been chiefly adduced and placed in bold relief by most of the writers on diseases of the skin, believing that the enumeration of minute distinctions and the recognition of modifications of the external characters would evince a more intimate knowledge of their nature than a display of their relations, not only with one another, but also with the state of the digestive, the assimilating, and the excreting functions, and of the circulating fluids. The devotion to "specialities," with the view of attracting the public by the presumed advantages of, and by the superior knowledge assumed from, a division of labour, was first manifested in modern times by the writers on skin affections; and, like all others devoted to a single craft, who adopt merely a minute segment of the great circle of medical science for their practices on the public, rather than for its proper cultivation and improvement, they merely partially advance the trivial and the mechanical to the detriment of profound or comprehensive views, and they fail in the recognition of extensive morbid relations. While a few local distinctions or mechanical contrivances are paraded as proofs of a superior acquaintance with the adopted subject, their narrowed powers of mental vision fail to recognise much more important relations and matters, the sources from which the local mischief proceeds, and the varied sympathies which either produce, or are produced by, the object of exclusive adoption and cultivation, a cultivation resembling merely the superficial scraping of the soil by the hands of savage ignorance, not the deep ditching, the draining, and the manuring of applied science. The human microcosm cannot be advantageously studied in one of its parts only, nor can its states, affections, or structural lesions be either understood or remedied by confining our inquiries and our means to a particular or limited locality, even although that locality is the seat of disease. The animal body is one and indivisible, no one part being independent of another—no single system, or organ, or tissue, being disordered or diseased without implicating more or less the functions, and even the organization of several, or even of all the rest. Hence it is that no division of labour which has been adopted in medical practice in ancient times, since the ages of the PHARAONS, down either to the modern days of

the higher and more regular grades of empiricism, or to the lower degrees of quackery and imposture, has tended to advance medical science or to raise the respectability of our profession. On the contrary, all such divisions, all adoptions of a single member, organ, or viscus for special practice or study, have lowered, in proportion to the degree of division, our science to a craft, and sunk the physician to an empirical practitioner: they may have enriched the charlatan, but they have degraded the profession.

40. Those who have taken the eruptions of the skin under their protection, or the "Dermatologists," as they have dignified themselves, have generally laboured to point out the extreme distinctions which may exist between the several forms or cases of scaly eruption; limiting, however, their distinctions to the form, the size, the tint, and the thickness of a scale; and to the form, size, hue, and condition of the tissue underneath. Their distinctions have been always local, and without reference to the states of the assimilating and depurating functions, and of the circulating fluids and excretions. Even the most important of all local distinctions have been neglected; for they have failed to show whether the scales are an exuberant formation of cuticle—are diseased cuticle hastily formed and as hastily thrown off—or are merely a thin albuminous exudation on the inflamed surface, that becomes altered by the action of the oxygen of the air, and thrown off by the local morbid action and the state of its vital and vascular relations; or in how far various states or appearances of these scales depend upon a morbid cuticular formation, or upon a modified albuminous exudation, upon the production by and upon the skin of an oxidized albumen.

41. *The diagnosis of scaly eruptions* is therefore hardly to be regarded as respects the several forms which they assume, because shades of difference, too slight and too varied, and ever varying, to admit of description, are even more common than more marked distinctions; but it may be entertained as regards other eruptions with which the squamous may be confounded, upon a hasty or imperfect view, and if the history, progress, and morbid relations of the case are not observed. The chief differences which exist between the leprous and other species of psoriasis are, that generally in the former the patches are circular, with raised margins and somewhat depressed centres, the scales being moderately thick and slightly adherent; while in the other species the patches are irregular, not depressed in their centres, and are covered by thinner and more adherent scales. Psoriasis guttata, however, very nearly approaches to the leprous species, especially to the aliphoid variety, the distinctions now stated existing in some respects, and the patches of the latter being generally of larger size. *Pityriasis* may be confounded with psoriasis; indeed, it is but slightly different, either in local characters or in pathological relations, from the several species of psoriasis; so that pityriasis, psoriasis, and lepra may be justly viewed as species of one genus. The distinction between pityriasis and the other species consists chiefly in the more superficial affection of the skin in the former, and in the smaller size and more

furfuraceous character of the scales. The integuments, moreover, are often chapped or fissured in the latter, and but rarely in the former. *Lichen circumscriptus*, with its annular clusters of papulæ, fading towards the centre, may sometimes be mistaken for leprous psoriasis, especially in process of cure; but the existence of the former is shown by the presence of marginal papulæ; whereas in the latter the inflamed surface, denuded of its scales, is smooth and devoid of papulæ. *Tinea annularis*, or ring-worm, at certain periods of its progress, either at the commencement or the end, when the crusts fall off and leave behind red annular-shaped patches, may be mistaken for lepra of the scalp, especially if there are patches on other parts of the body. But the one is as rarely seen on the body as the other is on the scalp; besides, the favous pustules of the former will indicate its nature. It should be recollected that several varieties of squamous eruption may exist in the same case, and that it may be associated with other eruptions, as with tinea.

42. IV. PROGNOSIS.—The several species of this eruption are more or less obstinate. The prognosis depends much upon the condition of the patient, and the duration, species, and state of the eruption. Even the mildest forms are apt to return after having disappeared, upon the recurrence of the causes, regimen, and diet especially, which first occasioned it. *Psoriasis guttata*, although not a severe form, is yet very obstinate, and is apt to return after disappearing. The *diffused variety* is still more obstinate, especially in debilitated, old, or cachectic persons; and the *inveterate form* often resists all treatment, particularly in those unfavourable circumstances. The same prognosis applies to the different forms of the *leprous species*. It is rarely attended by danger, and in young subjects it is often cured; but in adults and aged persons it is always very rebellious, and often incurable, although treatment may restrain its progress and palliate most of the more annoying symptoms. The existence of an hereditary predisposition to any of the species of scaly eruption militates strongly against a perfect cure, especially in patients advanced in life; for, even if almost or altogether removed, it seldom fails to return. The *sypilitic scaly eruptions*, when not associated with serious disease of the throat, or of the periosteum, or of the joints or bones, and not advanced to extensive ulceration, will generally be removed by appropriate treatment, unless the disease be developed in the serofulous diathesis, or is connected with an abuse of mercury, when a less favourable opinion of the result, as respects the constitution and vital organs, should be entertained.

43. V. THE PATHOLOGY OF SCALY ERUPTIONS has been imperfectly, if, indeed, at all considered. These eruptions have been viewed as altogether local, and their obvious dependence upon the state of the circulating fluids most unaccountably overlooked. Many years ago (in 1822) my attention was attracted to the state of the blood by a case of psoriasis, for which I had prescribed venesection, and found the serum remarkably milky or whitish-coloured. Since then other cases have furnished evidence of a superabundance of insufficiently assimilated chyle, of albumen, and sometimes of fatty matter in the blood of patients severely affected

with either of these eruptions. It is very obvious that impaired function of the liver and digestive canal, as well as of other assimilating organs, will be followed by the presence, if not by the superabundance of imperfectly assimilated chyle, and chyle-globules in the circulation; and that equally impaired excreting function will occasion a state of excrementitial plethora; the imperfectly assimilated and the effete materials thus accumulated in the blood exciting and perpetuating irritation of the capillary circulation of one or other of those emunctories whose office it is to remove these materials from the circulation. Irritation of the cutaneous surface having gone on to inflammation of a slow and chronic form, and the blood abounding with albumen, a state of capillary action and a material are thereby furnished for the formation of the scales which are so abundantly produced on the inflamed surface, and which is rarely, excepting at the commencement of the eruption, an altered state of the cuticle, and a morbid reproduction of it, but an exudation of albuminous lymph from the diseased capillaries that is modified by the state of the blood and the local action, and by the oxygen of the air, so as to form the several varieties of squamæ observed in this genus of eruption. This view of the nature of squamous eruptions shows the impropriety of employing local or external means solely or chiefly in the treatment, and of thereby shutting up a safety-valve in the economy opened by the course of functional disorders; and it accounts for the occasional supervention of serious visceral disease upon the suppression of the cutaneous eruption. It also suggests the use for these and similar eruptions of such means as shall most effectually remove the disorders of the digestive, of the assimilating, and of the excreting functions, upon which these eruptions are chiefly dependent, and the impropriety of prescribing external means otherwise than as aids to internal and constitutional treatment.

44. VI. TREATMENT.—The circumstances which require especial attention, before the intentions of cure are determined upon in each case of scaly eruption, are the following: 1st. The habit of body, diathesis, age, and employment of the patient. 2d. The indications of disorder of the digestive, of the assimilative, and of the depurative functions in connexion with nervous and vital power. 3d. The duration and character of the eruption, the causes in which it originated or tend to perpetuate it. These last circumstances should be viewed in connexion with the previous diet, mode of living, &c., commonly adopted by the patient. These particulars being ascertained, the *states* of those suffering any form of the eruption may be arranged as follows, as furnishing the chief bases for therapeutical intentions: *First*, as regards *habit of body*, &c., indications of *plethora*, or of *anæmia*, and of *digestive* and *excreting derangement* ought to be carefully observed, and the several associations of these states. *Second*, as respects the *duration* and *appearances of the eruption*, the amount and character of the *inflammation*, and the *discrete* or *confluent*, or *sypilitic* form of the eruption ought to be noted; and, *Third*, the state of *vascular action*, generally and locally, and of *constitutional power*. These data having been obtained as accurately as pos-

sible, and with due reference to the states of the blood and of the functions of waste and supply, the intentions are, 1st. To remove whatever disorder may exist in the quantity or quality of the blood, and in vascular action; 2d. To restore the digestive and depurative functions, as being subsidiary to the first indication; and, 3d. To correct the morbid action on the skin by rational local means.

45. Viewing the cure of scaly eruptions as being thus dependent, at all times during treatment, upon a due exercise of the several vital actions, especially those of digestion and depuration, and upon a sufficient, but not an exuberant supply of wholesome food, the application of these indications of cure should be accompanied with strict attention to *diet* and *regimen*, as noticed in the sequel, and with a careful avoidance of the several predisposing and exciting causes (§ 3, *et seq.*).

46. A. If the patient be *plethoric, strong, or young*, and the eruption copious, red, and not of long duration, and more especially if the pulse present sufficient tone, local and general action not being impaired or asthenic, then *blood-letting*, according to the peculiarities of the case, should unhesitatingly be prescribed; and in healthy, dry, and country localities, if the patient has lived fully or richly, it may be repeated, according to the effect produced by the first. After bleeding, an active antimonial *emetic* ought to be given, and its operation freely promoted. When the stomach is quieted, the bowels, and, through them, the liver, should be freely evacuated by chologogue and stomachic *purgatives*. At first, and on several occasions afterward, a full dose of calomel, with some purgative, ought to be prescribed, and its free operation promoted by an *enema* containing spirits of turpentine and castor oil, or some other cathartic. These should be repeated according to circumstances, but sufficiently often to procure not only an entire evacuation of all crudities and accumulations, but also an increased discharge of all secretions and excretions from the digestive canal, and, through the medium of it, all effete or injurious materials from the blood.

47. B. When the patient presents no indications of *vascular plethora* or of increased action, and the patches are not very irritable or much inflamed, then blood-letting may be omitted, or a small blood-letting only prescribed. In the metropolis and large manufacturing towns, vascular fulness and excitement are not generally such as require more than a small, or a local bleeding only; and not infrequently a state of anæmia, requiring opposite means to this, is met with in connexion with scaly eruptions.—*a.* For the former of these cases *emetics* and *purgatives* are indispensable, and for the latter they are not the less so; but the purgatives should be either conjoined with *chalybeates* or vegetable *tonics*, or alternated with them, so as to improve the powers of digestion and assimilation simultaneously with the evacuation of injurious matters. MM. CAZENAVE and SCHEDEL remark, that “when the patient is young and vigorous, and the disease pursues a rapid course, the skin being hot and inflamed, and the pulse full and quick, then venesection, simple baths, diluents, strict regimen, and quiet are necessary.” To these, however, I would add emetics

and purgatives, as above advised (§ 46). In old and feeble persons, or in constitutions broken down by privation or excesses, in whom there is either but little inflammation, or inflammation of an asthenic or cachectic character, a course of tonics should be directed, and either alternated with or followed by purgatives and other energetic measures, according to the peculiarities of the case.

48. M. BIETT, although he says nothing as to exhibition of an emetic either at the commencement or in the course of treatment, strongly recommends a purgative course, especially when the disease is recent, and the patient young or robust. He advises calomel every morning, fasting, in four-grain doses, either alone or with the same quantity of jalap. Sometimes sulphate of soda or sulphate of magnesia, taken in a considerable quantity of a bitter infusion, is very beneficial; and occasionally a more active purgative, as colocynth, scammony, gamboge, &c., may be employed. The choice should be guided by the conditions of the patient and of the eruption, and by the effects of the medicine previously employed. M. BIETT advises the calomel and the other purgatives to be continued daily for several weeks—for two months—if they do not produce a complete cure within that time. If salivation or other specific effects of the calomel appear, this substance may be omitted or the dose reduced; but this effect would seldom appear, and will not delay the cure. It is often necessary, or even advantageous, to suspend the treatment for three or four days, and then renew it. I have generally preferred to combine the calomel with rhubarb, and sometimes also with magnesia; or to give the calomel alone, much less frequently, and soon afterward a full dose of sulphur and magnesia; or the *pilula hydrarg.*, *chloridi comp.* with soap and extract of colchicum at bedtime, and sulphur with magnesia in the morning. When sulphur is prescribed with magnesia, an aromatic powder may be added, and the medicine continued once or twice daily, so as to keep up a free evacuation from the bowels for several weeks, the tepid or vapour bath, or other external means about to be stated being also employed in aid of them.

49. *b.* The *tincture of cantharides*, administered in any mucilaginous diluent in doses gradually increased from five to fifteen or twenty or thirty drops for a dose, was much praised by BIETT, and, as M. RAYER observes, occasionally causes the rapid disappearance of the eruption, especially of the leprous form, when not severe, or only recent and limited in extent. But if taken in larger doses, it may, although it relieves or removes the eruption, excite inflammation of the digestive or urinary organs, or of both.

50. *c.* The *arsenical preparations*, especially FOWLER'S solution, has proved very efficacious in scaly eruptions, and I have found it more certain in its effects than almost any other single medicine. But the good effects have seldom been permanent, or even so progressive as to effect a cure in the more severe cases, unless the diet be carefully regulated. There is often, also, a liability to a recurrence of the eruption after it has been removed by too large or too frequent doses of any arsenical preparation; but this liability exists in most cases, and is to be met only by a most careful avoid-

ance of the exciting causes. MM. CAZENAVE and SCHEDEL state, that as psoriasis is often more obstinate than lepra, the remedies, especially arsenic, should be pushed farther for the former affection; and that a permanent cure, without any dangerous results, may be obtained by the judicious administration of arsenical preparations. M. BIETT also entertains a similar opinion. These preparations should not be given oftener than twice daily, and the dose ought not to be larger than three drops at first, nor increased beyond ten or twelve. In many cases they should be given after a full meal, especially when the dose is large, and when the course is protracted; and, unless the dose is very small, an intermission in the use of the medicine for three or four days should be directed. The following is the mode in which I have usually prescribed arsenic for the cure of psoriasis:

No. 327. R. Liquoris Potassæ Arsenitis, ℥ij. ad ℥lv.; Liquoris Potassæ, ℥xxv. ad ℥xxxv.; Extr. Fluidi sarzæ comp., ʒj.; Tinct. Aurantii, ʒj. Infusi Gentianæ Comp., ʒx. Aq. Cinnamon., ʒss. M. Fiat Haustus bis quotidie sumendus.

51. I believe that large or too frequent doses of arsenical medicines are not only more injurious to the constitution, but actually much less beneficial, as regards the eruption, than either very small or very moderate doses. This circumstance will account for the not very favourable opinion expressed by Dr. A. T. THOMSON respecting them. He observes, "That notwithstanding the powerful influence of arsenic in psoriasis inveterata, I have met with cases which resisted it, even when administered in the largest doses. In some cases erysipelas has accompanied the use of the arsenical solution, in which case the remedy should be suspended until the erysipelas be removed, and afterward renewed in smaller doses." (P. 67.)

52. *d.* Dr. THOMSON adds, "That the medicine on which the greatest confidence may be placed in psoriasis is the *liquor potassæ*." He commences with thirty drops in two fluid ounces of the bitter almond emulsion twice a day, "and gradually increases the dose of the solution to eighty or even one hundred drops. If the patient be delicate, the infusion of yellow cinchona or of cascarrilla is substituted for the almond emulsion;" and he has found the hydrargyrum cum creta in doses of six or eight grains, at bedtime, a useful aid to this practice. I have employed a similar treatment, but could rarely succeed in getting the patient to take so large doses of the solution as he advises; indeed, I view them as injurious to the digestive organs and kidneys. I have seen marked advantage derived from it conjoined with the *iodide of potassium*, and taken either in a bitter infusion or in one of the decoctions advised for this eruption.

53. *e.* The *bi-chloride of mercury*, taken in the decoction of cinchona, or of sarsaparilla, or of dulcanara, has been also recommended, and is beneficial in slight or recent cases; but has failed in every case of inveterate or of protracted leprous psoriasis in which I have tried it. Dr. A. T. THOMSON states, that he has found the combination of iodine with mercury the most successful of any mercurial preparation for this disease. "The *biniodide*, in doses of a sixth to a fourth of a grain, exerts almost a

specific influence upon the morbid state of the skin; and when given at the same time as the *iodide of arsenic*, and aided by blood-letting, it has rarely failed in curing the most inveterate cases." As the acrimony of the preparation has disturbed the alimentary canal, he has usually combined it either with opium or with conium, carefully avoiding ptyalism. As, however, he has usually combined the *biniodide of mercury* with the *iodide of arsenic*, it is difficult to determine what share each may have had in the cure. He prefers this preparation of arsenic to the liquor arsenicalis. The dose of it, at first, ought not to exceed one tenth of a grain; and in no instance should it be carried beyond one third of a grain. "Its obvious effects are quickness and hardness of pulse, with slight puffiness of the lower eyelids; but generally, before these symptoms display themselves, the disease has begun to yield. The symptoms which indicate a necessity for reducing the dose are, heat of the mouth and fauces, anxiety at the præcordia, pain at the epigastrium, or griping. If, besides these, there is tension, with stiffness around the eyes, erythema of the face, thirst, white tongue, the edges and tip of a florid red hue, and a quick pulse, the medicine should be suspended for some days. If nausea, cough, vertigo, or salivation supervene, it should be left off altogether. The employment of any arsenical preparation is inadmissible, if it cause an uneasy sensation in the chest from the first."

54. The reason of the failure of arsenic in the cure of leprous and inveterate psoriasis is, in many cases, the large or too frequent doses in which it has been prescribed; the poisonous effects of the arsenic being thereby produced before sufficient time is afforded for the development of the alterative operation of the mineral. Most writers who have depended chiefly on arsenic for the cure of scaly eruptions have advised small or moderate doses, and a protracted course of it. GIRDLESTONE, BIETT, RAYER, WILLAN, BATEMAN, and ERICHSEN advise from two to three drops twice a day, up to seven or eight, this dose not to be exceeded, and the course to be persevered in, if none of the injurious symptoms just noticed be occasioned by it.

55. *f.* Recently, a preparation of arsenic, iodine, and mercury has been strongly recommended for the most obstinate and inveterate cutaneous eruptions by Mr. DONOVAN, under the name of the "*Liquor Arsenici et Hydrargyri Iodidi*." The composition of this solution is as follows: Water, one drachm; arsenious acid, one eighth of a grain; peroxide of mercury, one fourth of a grain; iodine, as hydriodic acid, about three fourths of a grain. Twenty minims, three times a day, have been considered as a proper dose with which to commence a course of it, and forty minims, thrice daily, as the largest dose. I have prescribed this solution in many cases; but I consider the dose here advised as very much too large. If the tongue be at all foul or loaded, an emetic, followed by two or three doses of calomel and rhubarb, or jalap, ought to precede a course of it; and at first, from five to ten minims, twice or thrice daily, and very gradually increased to twenty or thirty, at the utmost, will be sufficient. This solution is most serviceable when the liver is

torpid or loaded, and in the strumous diathesis. It, as well as the biniodide of mercury, is very efficacious in the syphilitic scaly eruptions. Mr. DENDY recommends the occasional use of the warm nitro-muriatic foot-bath during the course of this solution.

56. As to the use of arsenical preparations in psoriasis and lepra, Mr. ERICHSEN very justly observes, that they should not be given until the disease had assumed a chronic or inactive character. As long as there is inflammatory redness, heat, or irritation of the patches, they ought not to be employed, as the irritation of the arsenic will augment these symptoms. Besides, during the earlier periods of the eruption, a cure may be effected by the antiphlogistic and other means I have above advised, especially by depletions, emetics, and purgatives, with strict attention to diet and regimen. It is only, therefore, in very indolent, or extensive squamous diseases, and after other remedies have failed, that any of the arsenical preparations should be prescribed; and in all circumstances they ought to be given cautiously, and their effects closely observed; for, if prescribed too largely, or too long, they may injure the constitution much more than the continuance of the eruption, which in many circumstances admits of palliation merely, and not of complete cure.

57. *g.* There are various other medicines that have been prescribed, internally, for the scaly eruptions. The chief of these are, the decoctions of *dulcamara*, of *guaiacum*, of *mezerion*, of *elm-bark*, the infusions of *nettles*, of *marsh rosemary*, the decoctions of *sarsaparilla*, *sulphur*, and the *sulphurets*, or the milk of sulphur conjoined with magnesia, or with either of the alkaline carbonates, and the æthiop's mineral and other preparations of *antimony*. Either of these infusions or decoctions may be made the vehicles for the administration of other more active agents, as the liquor potassæ, with or without the iodide of potassium, the liquor iodidi arsenici et hydragryri, the liquor hydrarg. bichloridi, &c. In some obstinate cases of psoriasis, after morbid secretions and excretions have been evacuated, I have lately resorted to the use of *spirit of turpentine*, internally and externally, prescribing this substance either alone or with oleum ricini, in doses of half a drachm, or of one drachm, twice or thrice daily, and, after two or three days, the occasional application of an epithem, or embrocation of this spirit over the part chiefly affected. The turpentine ought to be discontinued as soon as it irritates the kidneys, but persisted in if it acts gently on the bowels. It will be taken with little inconvenience on the surface of a little milk or coffee. I have occasionally prescribed *tar-water*, internally as well as externally. It will be found a medicine of considerable power in this and other cachectic disorders, if appropriately employed. *Pitch*, *tar*, and the *turpentines* have been recommended internally and externally for squamous diseases, and generally in the form of pill when administered internally, tar and the turpentines being rendered more or less consistent by means of magnesia. They are sometimes of service; but they often, in this form, pass into the large bowels undissolved, become excrementitious, and hence have little effect.

[Dr. EMERY, of the Hospital St. Louis, had his attention turned to the investigation of the different products of tar as remedial agents in the treatment of skin diseases, on account of the successful results he obtained from the use of tar, and because of the unpleasant odour it gave forth. Various preparations were had recourse to, the most valuable of which proved to be the concrete naphthaline, which Dr. EMERY tried in fourteen cases. In two cases, one of psoriasis gyrata, and the other lepra vulgaris, it failed in effecting any good; in the remaining twelve it proved more serviceable. Eight of these were men, and four women. In two of the cases, lepra vulgaris of from fifteen months to two years' duration, arsenical and iodic preparations had been previously tried; in the younger patient the arsenic at first seemed to do good, but the improvement soon ceased. An ointment prepared with two scruples of concrete naphthaline to thirty of lard was applied, causing the scales to fall off, leaving the skin of a violet colour, with white circles around. A perfect cure was effected in six weeks, and although three months have passed since, there has not been any relapse. In four other cases the men were labouring under inveterate psoriasis; in one of them it had existed sixteen years, and had resisted arsenical, iodic, and mercurial treatment. The tar ointment was had recourse to, and with decided advantage, but the man becoming impatient on account of his business, an ointment of naphthaline, twice the strength of that used in the preceding cases, was spread on compresses, and applied over the diseased parts night and morning. The man was cured in six weeks. When the ointment was applied too strong, it caused a burning heat, which was soon removed by emollient baths and poultices. The other six cases were also instances of psoriasis cured by the naphthaline ointment. Dr. EMERY states, that this remedy has an unpleasant odour, which passes off, and it is apt to irritate the skin and cause erysipelas, if it be not carefully watched.]

58. *C.* The state of the constitution, as well as of general and local action, should guide the physician in the choice of remedies, which ought to be chiefly antiphlogistic and evacuant, in the acute or early stage, and alterative and depurative in the chronic or advanced states. In many cases, however, alteratives and depurative remedies require to be combined with tonics and even with chalybeates; especially in *cachectic habits*, and when the eruption assumes a livid or dusky hue. In these, the iodide of potassium with the carbonate or solution of potass and sarsaparilla, or tonic infusions, or the iodide of iron with sirup of sarsaparilla, or the bi-chloride of mercury in the tincture or decoction of bark, with tincture of serpentaria, or the fluid extract of sarsaparilla, will generally be of great service; and, if a cure be not effected by these, aided by external means (§ 61, *et seq.*), then the preparations of arsenic, or the combinations of arsenic, iodine, and mercury, may be resorted to, as above recommended.

59. *D.* The syphilitic varieties of squamous eruption should be treated with strict reference to the history of the case, and the means which have already been employed and the period of their employment. Several severe cases of this eruption, some of which had either gone

on to extensive ulcerations or become complicated with disease of the throat, or the bones or joints, have at sundry times come under my care. For these there are certain remedies, which, if judiciously employed, may be viewed as specifics.—*a.* The oldest and not the least efficacious of these is the *bi-chloride of mercury*, prescribed either in the manner recommended by VAN SWEITEN, or given dissolved in alcohol, and taken in water with the hydrochlorate of ammonia, or in decoctions of sarsa, &c., or prescribed with the decoctions or infusions, or tinctures of cinchona, serpentaria, &c. When the eruption and its antecedent symptoms have not been attacked by a mercurial course, then the bi-chloride should be given in decided doses, and preferably soon after a full meal, either in the form of a pill and in gradually increased doses, as advised by VAN SWEITEN, or as just recommended, in either of which combinations it may be taken in the intervals between meals. Salivation, unless it be slight, need not be produced; although the specific effects should be continued for some time; when either of the other remedies next to be noticed should be prescribed, if the eruptions have not nearly or altogether disappeared.

60. *b.* The next specific remedy for this species of eruption is *iodine*. I believe that this substance, or any of its preparations, had not been prescribed for any form of syphilitic disease when first I ordered it in the summer of 1825, the formulæ, as well as an ioduret of sulphur, having been prepared by Mr. MORSON, the eminent operative chemist. At first I employed the iodine either in the form of a weak tincture, or in combination with potash, or the iodide of potash with the addition of pure iodine. Subsequently I preferred the iodide of potash, conjoined with liquor potassæ and sarsaparilla; full doses of PLUMMER'S pill being taken at bedtime. The iodides of mercury have more recently been employed for this eruption, and are generally beneficial; but they are not superior to the treatment which preceded them. They are, however, advantageously given in the form of pills at night, or night and morning, the iodide of potash being taken during the day, with liquor potassæ and sarsa. In the syphilitic species, also, Mr. DOXOVAN'S solution is an excellent remedy, and may be advantageously adopted in the more protracted cases.

61. *E.* The internal and external use of mineral waters, either natural or artificial, and of simple or medicated baths, will generally promote a cure. It is preferable, however, not to have recourse to these until morbidly increased action and vascular or excrementitial plethora is removed by depletions, emetics, purgatives, antimonials, &c. But this end being attained, the sulphur waters of HARROWGATE, LEAMINGTON, MOFFAT, CROFTON, and of other springs in this country; or of those of Bareges, Cantelets, Bagnères, Bagnoles, &c., on the Continent, will be employed with great advantage. A frequent use of warm baths, the patient remaining in them for a considerable time, and using gentle friction over the affected parts, will often be of service. A small quantity of the sulphuret of potash may be added to the bath. If the eruption be attended by much itching, the biborate of soda dissolved in the water will prove very beneficial. Dr. DUFFIN recom-

mends the immersion of the part, especially when the extremities are chiefly affected, in warm artificial Harrowgate water; or the diseased parts to be washed or fomented with it twice or thrice daily, for fifteen or twenty minutes each time; and a mixture of equal parts of the weak citrine and tar ointments to be applied after each fomentation. The following formula is given by him for the preparation of this water: Sulph. magnesiæ, ʒij ; supertart. potassæ, gr. x.; sulphat. potassæ cum sulphure (or sal polychrest), ʒss . These are directed to be dissolved in twenty-four ounces of warm water, and used for a wash or fomentation. I have lately employed a wash or fomentation, either warm or tepid, with tar-water, containing biborate of soda dissolved in it.

62. If the scales adhere or are accumulated in crusts, sulphureous vapour baths, followed by frictions, or gently stimulating ablutions, or fomentations, with a solution of the biborate of soda, or with a little liquor potassæ, will be of service. The application of steam or vapour, with or without the fumes of sulphur, is always of use. Lotions of diluted alcohol, of solutions of sulphuret of potash, or the decoction of dulcamara, will aid the exfoliation. When the scales are removed, BATEMAN and THOMSON recommend the unguentum picis, or the unguentum hydrargyri nitratis, diluted with the ceratum plumbi compositum, or with simple ointment; or, which is better than either, an ointment composed of equal parts of these two ointments. The ointments which I have preferred are the *ioduret of sulphur ointment* (gr. xij . or xj . to ʒj .), the *calomel ointment* (ʒj . to ʒj .), the *ointment of white precipitate*, the *zinc and lead ointments conjoined*, and the several ointments of the *nitrates of mercury* and of the *iodide of mercury*. These last should, however, be employed more or less diluted. The ointments containing either of the iodides are most suited to very obstinate cases, the others for slight or recent cases. The iodide of sulphur ointment was first employed by the author in 1825. The ointments should be applied at night and washed off in the morning with a saponaceous or alkaline lotion (as ʒij . of liquor potassæ in ʒvij . ss. of water), after which a solution of the bi-chloride of mercury in dilute alcohol (gr. ij . in ʒi . p.) may be applied slightly by a sponge over the part. Besides these ointments, others, with the acetate or phosphate of mercury, with the sulphate and deutoxide of antimony, with an ioduret of ammonia (ʒj . to ʒj .), with camphor, or with concrete naphthaline (two to four parts to thirty parts of lard), have severally been recommended by different writers. A principal advantage derived from ointments is the protection of the inflamed surface from the action of the air, to which very insufficient attention has been directed in the treatment of cutaneous inflammations. Therefore, after the surface has been cleaned by any of these ointments, they should be washed off, and some gelatinous, albuminous, or gummy preparation applied to it, so as to exclude the air, as advised for PITIRIASIS (§ 27); and this preparation should be allowed to remain as long as it answers this purpose, when it should be removed by fomentations and ablution, and reapplied until the parts are completely restored. I have lately employed for scaly eruptions a lotion of

one part of *Glycerine*, to three, four, or five parts of water, with marked benefit; and Dr GLOVER has recommended *Iodoform* externally (3ss.—5i. to the ʒj. of cerate), and internally, in doses of two or three grains twice or thrice daily.*

63. As I have shown in the article *PRYRIASIS*, the chief causes of the obstinacy of scaly and other cutaneous eruptions, are, 1st. The action of the air, from which they are not sufficiently protected during the treatment; 2d. The want of due attention to the state of the assimilative and depurative functions of the blood; and, 3d. Insufficient restrictions on diet and regimen. But, even when a cure is obtained, or nearly obtained, a relapse or a return of the eruption is a frequent occurrence—a relapse generally proceeding either from the causes just specified, or from a premature relinquishment of treatment; a subsequent return of the disease resulting from the same causes as produced it at first, or from inattention to the several digestive and excreting functions. Both these unfavourable contingencies are most likely to occur when the functions of the several abdominal organs have not received due attention during the treatment, and a restoration of them to the healthy state has not been effected; and also when the healthy conditions and colour of the parts affected have not been completely restored before the successful means were relinquished. These two causes, especially when acting simultaneously, with errors in diet and regimen, are most influential in producing relapses, and returns, at more or less remote periods, of scaly eruptions; and they are of greater importance than they have hitherto been considered.

64. The local forms of psoriasis and lepra, mentioned above (§ 16, *et seq.*), require chiefly the adaptation of the general and local treatment already described to the circumstances of each case.—(a) *Psoriasis palpebrarum* will often be benefited by the application of three or five leeches behind the ears, and by a lotion consisting of a weak solution of the nitrate of silver, or a lotion of sulphate of zinc, or diluted tincture of iodine, to the part. The calomel ointment, or the zinc ointment, or a diluted nitrate of mercury ointment, may be severally applied in this and the other local forms of the eruption.—(b) For *psoriasis genitalium*, emollient local baths, and the use of the lotions and ointments just mentioned, are most beneficial. If these forms be attended, as they usually are, with much itching or irritation, a solution of the bi-borate of soda in tar water, or in some emollient fluid, containing creasote, applied as a lotion, or by a sponge, will generally give relief and remove the eruption. Sulphur and cinabar fumigations are usually successful when the scrotum or anus is implicated.—(c) For *psoriasis palmaria*, after soothing the parts with local baths of the decoction of bran, &c., ointments containing the iodide of sulphur, or the iodide of mercury, or the other ointments already mentioned, may be employed in aid of the constitutional remedies recommended. In the more chronic states of psoriasis palmaris, Mr. WILSON advises a spirituous lotion of bichloride of mercury, followed by water dressing.

65. The mineral acids have been favourably

mentioned by some writers; but I have seldom observed much benefit derived from them, and have even believed them to have been sometimes injurious. In a few cases, however, after a due evacuation of accumulated secretions and excretions, the liver still continuing torpid, the nitro-muriatic acids given internally and employed externally have appeared of some use; and the sulphuric acid has occasionally been added, with marked advantage, to the neutral sulphates, dissolved in bitter infusions, and taken in quantities sufficient to keep the bowels freely open. Dr. C. SMITH and Dr. CUMMINS, however, are of opinion that dilute sulphuric acid possesses considerable efficacy in the treatment of squamous eruptions; the latter physician believing that the acid is decomposed, and that the system is thereby impregnated with sulphur. This may be the case when the quantity taken is small or very moderate; but in some experiments I found that the dilute acid, when given in large and frequent doses, could be detected unchanged in the urine. Acids, however, ought to be employed with caution, and with strict reference to the excretions, especially the urine and its saline constituents.

66. The diet and regimen are of the greatest importance in the treatment of all the scaly eruptions, and are often more beneficial, if strictly enforced, than even medical means. Animal food should be used sparingly; and pork, veal, ham, dried or smoked and preserved meats; fish and shell-fish, especially fried and rich fish; rich sauces, doughy articles, pastry, or pie-crust; pickles and preserves; heating and stimulating beverages, especially spirituous and malt liquors, coffee, punch, acid wines, &c., ought to be constantly avoided; and sugar, butter, and sweet or acidulated articles very sparingly taken. The remarks offered on this topic in the article *PRYRIASIS* (§ 34), a species of the eruption now treated of, strictly apply to the treatment of these eruptions.

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* Gun cotton dissolved in ether is one of the best applications in these cases.]

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PUERPERAL STATES AND DISEASES.

—THE PATHOLOGY OF PARTURITION.—DISEASES INCIDENTAL TO THE PUERPERAL STATES.
CLASSIF.—GENERAL PATHOLOGY.—SPECIAL PATHOLOGY.

1. Several of the diseases incidental to parturition and to convalescence from this act are discussed under their special denominations; and to these I shall refer as they successively take their places in the group of maladies usually called "*Puerperal*." In this place, therefore, it chiefly remains to discuss, 1st. *The pathological relations of the puerperal state*; and, 2d. *The very dangerous and often malignant maladies incidental to it, which are not treated of under other heads*. That a view of the pathological relations of the puerperal state, impartially exhibited, and without reference to peculiar doctrines, will be of use, it is hoped, in guiding the inexperienced during their intercourse with the deviations from the more common procession of morbid phenomena which will occasionally be met with by them, is only a reasonable expectation; and hence an inducement to undertake the labour which a faithful exhibition of this view involves.

2. I. THE PATHOLOGY OF THE PUERPERAL STATES.—I. OF THE STATE OF THE FEMALE AT THE MOST ADVANCED OR FULL PERIOD OF PREGNANCY.—The changes, as well as the principal deviations from the healthy state, during utero-gestation, are described in the article PREGNANCY, and under various other heads. It only remains to notice the state presented by the female economy when gestation is approaching, or has reached its full period. The uterus then has attained its utmost size; and it then enjoys a copious determination of blood for the nourishment and growth of the fetus, and for the preservation of its own augmented structure. The distended uterus, especially in a first pregnancy, presses more or less, according to the size of the female and the capacity of the abdomen, upon the other viscera, especially on the urinary bladder, the kidneys, the rectum, and large bowels, the liver and biliary apparatus, and stomach; and, consequently, the descent of the diaphragm is impeded, and congestion of the lungs is favoured. But the pressure also influences the circulation through the large venous trunks, and often, in some degree, through the heart and lungs; hence arise congestion of remote parts, especially of the veins of the lower extremities, often followed by

œdema, and congestion of the sinuses within the cranium, with the dangerous consequences of this condition. The effects produced by the large size of the uterus are very much aggravated if pressure upon the lower bowels be allowed to interrupt the regular process of fecation and excretion, and if this cause or indigestion should give rise to flatulent collections in any portion of the alimentary canal.

3. With the increased development of the pregnant uterus, the peritoneal envelope of the organ, and even the ligaments experience a remarkable change, and are inordinately stretched, so as to favour the supervention of inflammation, especially upon the removal of the distending cause, when additional influences come into operation. With the ascent of the fundus of the uterus, the omentum is more or less displaced, and carried upward; its exact position and influence upon adjoining parts varying with the quantity of adipose substance it may contain.

4. It is obvious that changes of the position and condition of the viscera must influence more or less the functions performed by these viscera; and that, both during the progress of these changes and at their consummation, various disorders, noticed under PREGNANCY, are liable to appear; that the secretion and excretion of urine should be disturbed or impeded, or even arrested, the functions of digestion and assimilation disordered, the intestinal secretions and excretions interrupted, and sensibility and motion materially disturbed. At the full period of gestation, the circulating and respiratory organs, and still more the nervous centres, owing to the congestions to which they are exposed at this period, are severally liable to the most serious attacks as soon as the congestion, in which these attacks originate, is carried to the pitch requisite for their development.

5. In connexion generally with the changes now mentioned, if not always dependent upon these changes, the nervous system generally acquires increased sensibility and susceptibility of impression; and, through the medium of this system more directly, and through that of the vascular system more indirectly, the whole frame intimately sympathizes with the uterus, independently of the mechanical effects produced by it upon the other viscera. The nervous development of this organ, and the vascular determination to it, influenced by the nervous organization, renders the womb the centre of numerous sympathies and the source of many morbid phenomena, all which increase and become more prominent with the progress of pregnancy, and still more manifest at the full period, during parturition, and for some time after delivery. The activity of the nervous influence, and of the vascular circulation of the uterus at an advanced stage of pregnancy, influences remarkably the conditions of both the nervous and the vascular system generally, notwithstanding the various pathological conditions tending to impair the energy and sensibility of the one, and the tone and action of the other—notwithstanding interrupted excretion, and the various circumstances favouring excrementitious contamination of the blood, and congestion of it in venous trunks and sinuses.

6. II. OF THE CHANGES TAKING PLACE DURING THE PARTURIENT PROCESS, AND THEIR INFLU-

ENCES IN CAUSING DISEASE.—The uterus, having completed its function of fetal development, or having carried this function as far as is consistent with the health and subsequent safety of the mother, experiences that state of action which is the best calculated to preserve both the child and the parent from injury and disease. But during this action, and the changes in the nervous and vascular systems which it more or less remarkably produces, various morbid conditions are apt to appear. The painful contractions of the uterus, although occurring only at intervals, tend to excite or react upon the nervous systems generally, but more remarkably upon the spinal cord, and through it upon the brain. These contractions also tend to diminish the flux of blood to the uterus, and to determine it in greater quantity to the brain, and thereby to change a pre-existent state of passive congestion into active and increased congestion, or to carry a condition of the vascular system, which was insufficient to produce acute disease, to that pitch which instantly develops such disease.

7. The uterine actions, although often thus productive of seizures depending upon the states of the cerebro-spinal nervous centres, especially as regards the circulation of these centres and the peculiarities of that circulation, are yet independent of these states. This fact is undeniably demonstrated by the occurrence of uterine action independently of the will, and during abolition of the functions of the cerebro-spinal system; by natural parturition taking place during paraplegia as well as hemiplegia, and as shown recently by the regular progress of the parturient process, while sensibility and voluntary motion are abolished by the inhalation of ether or of chloroform. It is obvious that the muscular contractions, and the painful excitement of the uterine nerves during parturition, will occasionally develop morbid tendencies in the nervous system when these already exist, owing either to hereditary or to acquired predisposition, and consequently that convulsive or apoplectic seizures, or phrenitic or maniacal attacks will occasionally appear during this process; the convulsive seizure presenting more or less of the apoplectic, of the epileptic, or of the simply convulsive character, according to the predisposition and peculiar circumstances of the case; the maniacal attacks rarely appearing during parturition, although frequently after this process. Convulsive seizures are not confined to parturition, for they occasionally take place previously to, as well as after, this process; but during it they are more apt to assume an apoplectic or epileptic, or a mixed form—in consequence of the greater liability to active congestion of the brain and spinal cord during the parturient act—the apoplectic being characterized by profound coma and stertorous breathing, with slight convulsions, the epileptic by the violence of the convulsions, by frothing at the mouth and injury to the tongue. (*See articles CONVULSIONS, PUERPERAL; and INSANITY, PUERPERAL.*)

8. Certain changes in the uterus itself may take place during pregnancy, or even may have existed previously, and may arrive at a dangerous or even fatal termination upon the accession or in the course of parturition. Thus in-

flammation may have attacked a portion of the pregnant uterus and occasioned softening, or impaired action and tone, or even a greater lacerability of that portion, in consequence of either of which changes rupture of the uterus, or dangerous hemorrhage may take place during parturition; or, if either of these do not supervene, inflammation of the uterus, or of its veins or sinuses, or peritonitis, or puerperal fever, may follow delivery, the previously diseased state, and the exhausted tone and contractile power of the organ especially favouring the occurrence of these maladies.

9. There are various circumstances connected with parturition productive of disease either of the uterus or of adjoining and associated parts. The interferences arising out of impatience and want of confidence in the efforts of nature, a premature or inconsiderate, or a too long delayed recourse to medicinal or mechanical aids of parturition, and the injury which these may occasion either to the uterus or to parts in the vicinity, or even to both, are among the most influential causes of disease, not only of the parts thereby injured, but of the frame generally through the media of the nervous and vascular systems. The means which have recently been recommended for the prevention of pain during parturition, although quite competent to the production of this result, cannot be viewed as altogether innocuous. Several instances have already occurred, evincing not merely dangerous, but actually fatal effects from recourse to them. A fatal issue may certainly be prevented from taking place immediately from these means; but the changes which may terminate fatally cannot be so readily prevented in all cases, and at the same time accomplish the intention for which they are employed. These anæsthetic agents have been demonstratively shown not only to destroy sensibility for a time, when inhaled for a short period, but also, in comparatively short periods of inhalation, to produce congestion of the lungs, a manifest change in the state of the blood, and even a rapidly fatal result. That these agents, when adroitly and cautiously administered, may not occasion any inconvenience subsequently to their inhalation may be the case, in nine out of ten instances in which they have been employed, will be readily admitted, but the tenth instance may be one of serious puerperal disease, of convulsions, or of mania, or of fever, or of congestive pneumonia, or bronchitis, owing to the previous state and predisposition of the patient: events which cannot be anticipated or guarded against by the physician. Pain is often salutary as respects its effects, and especially in enabling the economy to resist, and to rally against, the depressing operation of shocks upon the vital influence; and, when neither its violence nor its continuance is productive of injury to the constitution, or of exhaustion of vital power, to endure it is preferable to the annihilating of sensibility by an agent which acts so remarkably, and so immediately upon the chief manifestation of animal life, arrests the usual processes of nature, and even terminates existence itself if employed a few seconds longer than is required to destroy this the highest function of living creatures.

[On the other hand, it is not to be forgotten

that very serious consequences often happen from the shock produced by pain itself, as in a severe surgical operation, or from parturient throes, and that there may be less danger in overcoming these pains, and thus preventing the shock, than in allowing them to go on unimpeded. There is a choice of evils, and, if possible, we are to select the least. We have been led to believe, from what we have observed, that the general employment of anæsthetic agents in midwifery is inexpedient, being not unattended with danger. Dr. J. C. WARREN has very justly observed, that there is no parity between the abolition of pain in surgical operations and the abolition of the pains of labour, the former being only a part of that general law for preservation against injury, in consequence of which, whenever a foreign body threatens to impair the integrity of an organ, pain is produced, and the organ is instinctively withdrawn from the contact. While, therefore, there is nothing contrary to the laws of nature in the removal of pain from surgical operations, that which regulates the pains of labour is a general law, its final cause being sufficiently plain to show its utility, if not its necessity. It would certainly seem, *à priori*, that the use of so powerful an application through the whole period of a natural labour would, in proportion to the term of that labour, increase the dangerous tendency to organic excitation; and when this period is very protracted it might bring on distressing derangements of the stomach, brain, spinal marrow, or uterus, besides in many cases suspending the uterine contractions. Dr. W. is of opinion that the cases in which either or chloroform can be properly resorted to in midwifery should be exceptions; such as, 1st. In a natural labour, when the pains are uncommonly severe, especially the terminating pains in a first parturition. 2d. During limited periods of labours prolonged by a preternatural cause. 3d. When, from the peculiarity of constitution, the patient cannot without danger support the usual amount of suffering. 4th. For the purpose of obtaining relaxation in irregular contractions of the uterus, as the hour-glass contraction after delivery.

On the contrary, there are other highly respectable accoucheurs who advocate the general use of anæsthetic agents in midwifery practice, as Professors SIMPSON, of Edinburgh, and W. CHANNING, of Boston, Mass. The former states that he has employed chloroform in almost every case of parturition for the last six months or more, not only without danger, but without any unpleasant symptoms. The testimony of Dr. CHANNING is also to the same effect. The conclusion, then, to which we are forced to come, in consideration of all the facts before us, is, that in properly-regulated doses, anæsthetic agents, like other powerful narcotics, as morphia, &c., may be administered not only with safety, but with the highest advantage, provided there be no contra-indicating circumstances, and due attention be paid to condition, age, temperament, sex, and constitution. We have found a small inhaler the most convenient method of giving chloroform, so as to regulate the dose with proper exactness. In this vessel place fifteen to twenty drops of pure chloroform, and let the patient inhale it carefully; if the dose is not sufficient, add ten or

fifteen drops more, which will usually be found an ample quantity to annul sensibility, if not consciousness.]

10. iii. OF THE STATE OF THE FEMALE AFTER PARTURITION, AND ITS INFLUENCE IN FAVOURING THE OCCURRENCE OF DISEASE.—In estimating the state of the female upon delivery, the previous conditions now passed in review, those just antecedent to parturition, and the act of parturition itself, ought to be held in recollection. The pressure produced by the gravid uterus upon adjoining viscera, and the effects of that pressure, as shown above (§ 6, *et seq.*), are now suddenly removed. The vitality of the frame has sustained some degree of shock from the violent contractions of the uterus, the expulsion of the fetus, and the detachment of the placenta, as well as from the sudden loss of blood, and the removal of pressure and distention. The internal surface of the uterus, moreover, resembles that of an extensive wound, especially where the placenta was attached to it; while the peritoneal surface of the organ, and the positions and physical conditions of the several abdominal viscera, are now more or less changed. The general results of these concurrent changes are not severely felt by robust or sound constitutions, beyond what may be viewed as a slight shock to the vital energy, attended by more or less exhaustion consequent upon the pains, the uterine action, and the loss of blood; but this result in these constitutions amounts not to disease; it is merely a state of vital exhaustion, which nature soon repairs, but which readily favours the development of disease whenever any of the causes to which puerperal females are often exposed comes into operation. It is different, however, with females who are otherwise circumstanced, especially with the delicate, the insufficiently nourished, and the morally depressed. If there exist a deficiency or poorness of blood; if faecal accumulations have formed in the large bowels; if the patient be nervous, hysterical, or subject to sudden or epileptic seizures; if she entertain fears of her state, or anxieties as to the present or future; and if she be exposed to the impure air of a low, miasmatic, damp, and close chamber or locality; or to the contaminating and infectious air of an hospital; or to any of the numerous causes which induce the diseases incidental to child-bed, then the effects, whatever may be the especial form which they assume, will be most serious and often fatal.

11. In proportion to the severity of shock produced by the parturient act upon the vital energy, and to the susceptibility of the nervous influence and sensibility of the patient, will the liability to the supervention of puerperal maladies be great. Mania, watchfulness, headache, convulsions, imperfect contractions of the uterus, or an impeded return of the organ to the size proper to the time which has elapsed since delivery; suppression of, or irregularities in, the lochial discharge; suppression of the secretion of milk, &c., may severally follow severity of shock, especially when heightened by marked susceptibility and sensibility; and these latter will in their turn be greatly aggravated by large losses of blood relatively to the condition of the vascular system, even although no other malady be superinduced. After consid-

erable hemorrhage, also, particularly when vital exhaustion is remarkable, or when the mind is anxious or depressed, morbid emanations strongly impress the nervous system, and readily pass, by endosmose, into the pulmonary circulation. The contractions of the uterus being then also inefficiently produced, the lochial discharge is partially retained and rapidly altered; and, thus altered, it is partially imbibed by the vessels opening on the internal surface of the uterus, inflaming these vessels and venous sinuses. But the matters retained in the uterus may not merely inflame these vessels, they may also contaminate the organ itself; and being imbibed and absorbed into the circulation, contaminate also the whole mass of blood, with or without manifest change in the uterine vessels and structure; and, moreover, after such contamination, superinduce remarkable constitutional effects and structural lesions of those parts especially which have undergone the more evident alterations as to position and condition during the successive stages of gestation and parturition.

12. Thus, after parturition, the female frame is particularly open and liable to be invaded by the most influential causes of disease: 1st. By mental excitement and impulse, and by moral depression. 2d. By the inhalation of morbid effluvia, proceeding either from other diseases, or from the decomposition of animal discharges and secretions, or from the other sources generally productive of infectious emanations. 3d. By the absorption from the cavity of the uterus itself of retained and partially decomposed discharges. 4th. By infectious matters retained in the foul bed-clothes, mattresses, or beds in which the female is confined. 5th. By the retention and absorption of altered secretions and excretions, or of fecal matters from the alimentary canal; and, 6th. By interrupted secretion and excretion, the blood being altered more or less, owing to the accumulation in it of morbid or excrementitious materials.

13. iv. OF CONVALESCENCE AFTER PARTURITION.—A. THE NATURAL COURSE OF CONVALESCENCE.—a. The shock consequent upon delivery soon subsides when it is moderate and the patient obtains a few hours' sleep, if all disturbance or excitement be prevented. In proportion to the subsidence of this effect upon the vital power, the comfort and repose of the patient return, and nervous symptoms or vascular excitement are prevented. As the shock subsides and exhaustion is diminished, so are the several secretions and excretions, with the new secretion of milk, re-established. The circulation, as indicated by the pulse, which was excited or increased in frequency during the progress of labour, falls below the natural standard immediately after, and continues below it during a few hours. After varying somewhat for the following fourteen or fifteen hours, the circulation becomes slightly increased on the secretion of milk; and, when this secretion is established, it generally continues about the natural state.

14. b. The uterus contracts more or less firmly immediately after delivery, so as to reduce it, in the more energetic cases of contraction, to about the size of the infant's head. This contraction, 1st. Prevents hemorrhage; 2d. Empties the cavity of the uterus, and prevents

the lodgment of coagula; 3d. It constricts the uterine vessels and sinuses, evacuates their contents, and prevents their tendency to imbibe fluids, which may be retained in the cavity of the womb; and, 4th. It diminishes the afflux of blood to the uterus. The contraction and diminishing size of the womb proceed, although not regularly, or without recurrences of slight relaxation, until about the eighth, or ninth, or tenth day, when it descends into the pelvis. Previous to the eighth day, its state may be ascertained through the relaxed abdominal parietes; but afterward the fundus only can be felt above the pubis, and in six or seven days it can no longer be detected. This diminution of bulk is not altogether attributable to contraction, but to absorption in part, and in no small degree to the exclusion of the supply of blood, and to the pressure, by the contraction of the uterine fibres, of the fluids from the vessels and the interstices of the structure. It may, however, be doubted whether absorption is concerned in lessening the size of the womb after delivery, the lochial discharge probably contributing to this result.

15. c. The condition of the internal surface of the uterus, after delivery, is a matter of interest. "For several days after parturition, when no disease of the uterus has supervened, its lining membrane is coated with a yellowish brown, dark red, or ash-gray coloured layer of no great thickness, which seems to be formed chiefly of the fibrine of the blood, with small portions of deciduous membrane." The part to which the *placenta* was attached is raised above the surrounding level: its surface is unequal, resembling in this respect a granulating ulcer; its size is wonderfully reduced. In this situation dark-coloured coagula are found sealing up the orifices of the uterine sinuses, and frequently extending into the veins. The structure of the uterus is found to be less dense than natural, and the fibres more distinct. The *os* and *cervix uteri* are covered with ecchymoses, as if severely bruised; and sometimes small lacerations are observed on the edge. The orifice remains open for some days, but gradually closes. The *vagina* soon recovers its former calibre; considerable heat and soreness of it are experienced for only a short time, unless the head of the child have remained long in the pelvis, or the lochia be very acrid, when they are prolonged or pass on to inflammation of a more or less severe character. The vulva also resumes its natural capacity in a shorter time than might be expected. (See CHURCHILL.)

16. d. After-pains require no mention at this place, as they are considered under that head. (See art. AFTER-PAINS.) The lochia is merely a continuation of the discharge of blood which attends delivery, and proceeds from the vessels exposed by the separation of the placenta. For three, or four, or five days it continues of a red colour; but it is much thinner, and more watery than blood, and it is not coagulable. It then sometimes becomes yellowish, retaining its serous consistence; but it most frequently changes successively to greenish, yellowish, and, lastly, to a turbid appearance. The quantity and continuance of this discharge vary remarkably. Of the former no estimate can well be formed; the latter varies much; but the discharge seldom ceases altogether in a short-

er period than three weeks, unless in consequence of disease, or continues longer than a month. Its sudden disappearance, and even its short duration or scanty quantity, are important symptoms of puerperal disease.

17. *c.* The *several secretions and excretions* are more or less affected during the puerperal states. During parturition the *perspiration* is abundant, but diminishes gradually after delivery; but it usually continues free, and has a faint, sickly odour, until convalescence is fully established, when the skin presents its usual state. The *urine* varies in quantity with the abundance of perspiration and of fluid ingesta, and also with the *state of the bowels*, which also vary, owing to their previous conditions and other circumstances. The *milk* is secreted immediately, or soon after delivery. A serous fluid, approaching to, but in some respects differing from true milk, is generally secreted for some time before parturition; and occasionally true milk is secreted during labour, although rarely with first children. In this case the mother can suckle immediately after delivery. But more frequently the milk is not secreted for eighteen, or twenty-four, or thirty-six hours, when the breasts enlarge and stinging pains shoot through them. As the parturient shock passes off, and the contracted state of the uterus diverts the vascular determination from this organ, the secretion of milk commences and increases.

18. *f.* With the development of this new function a general disturbance of the system, constituting what is termed the *milk fever*, is produced. The severity and duration of this disturbance are influenced chiefly by the circumstance of the woman's nursing the infant or discouraging the secretion of milk, and by the state of the bowels and of the other secretions. At first, or about the second or beginning of the third day, the *mammæ* are heavier, larger, and tender, and the patient has slight chills or rigours, followed by heat of skin, soreness of the breasts, and acceleration of pulse. With these symptoms the secretion commences, at first slowly and with difficulty, but afterward more freely. As the secretion becomes more abundant, the above symptoms abate, and in two or three days disappear. The milk first secreted is thicker and richer than that which follows, and acts as an aperient to the infant. (*See art. LACTATION.*)

19. *B. DEVIATIONS FROM THE NATURAL AND HEALTHY COURSE OF CONVALESCENCE AFTER DELIVERY.*—Dr. HAMILTON justly remarks, 1st. That when there has been unusual suffering during labour, the usual changes after delivery cannot be expected to proceed in a healthy manner, because the exhaustion of sensorial power must more or less paralyze the actions of every part of the system; 2d. That the violent pressure to which the parts concerned in the mechanism of labour have been subjected must occasion a tendency to inflammation; and, 3d. That the violent and continued actions of the respiratory organs must render them liable to derangement. But, however influential these causes may prove in occasioning deviations from the ordinary course of convalescence, there are others not the less so, and these consist, 1st. Of disorders previously existing, or occurring during pregnancy; 2d. Of

peculiarity of constitution or predisposition; 3d. Of mental agitation and moral influences; and, 4th. Of numerous circumstances occurring, and of causes coming into operation after delivery.

20. (*a*) The *nervous shock* may be so very severe as to create alarm. The patient has the aspect of a person in a state of collapse or extreme exhaustion. The countenance is expressive of anxiety; the senses are either morbidly acute, or, what is still worse, unnaturally dull; the pulse is very rapid, small, and weak, or very slow, laboured, or irregular; and the respiration is hurried, panting, and often more frequent than accords with the state of the pulse. Between this more extreme state of vital shock and the natural state there are numerous grades; and even in the slighter states reaction may be long deferred, or may take place imperfectly, or even excessively. In the more extreme states of shock, death may occur in a few hours, without any attempts at reaction being made, the vital sinking proceeding until life is terminated.*

21. *Dissection*, in these cases, detects no lesion to account for death. Dr. CHURCHILL remarks, that of several cases of this kind which he has seen, one was tedious, but terminated naturally, and two others were instrumental deliveries. A due estimate of the nervous shock is of great importance in severe cases; for in most instances the progress of convalescence is in inverse proportion to the amount of this disturbance. In some persons slight circumstances increase, in a wonderful degree, the susceptibility of impression; and, if this be overlooked, very serious results may follow.

22. (*b*) The *state of the pulse* is of the utmost importance after delivery. If it continue frequent or very quick, one of two, or even three, things is to be apprehended, even although no other untoward symptom may exist, namely, hemorrhage, internal or external, or the accession of inflammation, or of puerperal fever. Dr. CHURCHILL observes that, in almost all the cases of flooding after labour, he has found the pulse remain quick, and perhaps full, up to the occurrence of the attack. He might have extended the observation to inflammations and puerperal fevers; seeing that the phenomenon is equally applicable to them and to the commencement of lactation, to after-pains and to the retention of coagula, in some constitutions. The remark of Dr. JOHN CLARKE that no woman should be considered as safe whose pulse exceeds 100 is certainly just; and I may add, that if the pulse exceed 110, then the risk of puerperal fever or of internal hemorrhage having commenced, is very great; and a careful examination of all the symptoms of the case should be made, and the coming mischief anticipated, and, if possible, prevented.

23. When, with increased quickness of pulse, it is found that the uterus has not decreased so far in size as might have been expected from the time that had elapsed since delivery, or

[* We have known several cases of death from nervous shock after child-birth even as late as the second or third week, in very delicate females, and where no morbid changes could be found after death. In two instances the fatal result was caused by strong mental excitement when in a very feeble condition; syncope succeeded, from which the patient could not be roused. These cases require very great caution, in order to guard against accident.]

that, having been diminished, its bulk has increased about the fourth or fifth day, then inflammation of the womb or of its vessels may be expected to declare itself, if it have not already done so, by increased tenderness, by less firmness of the uterine tumour, by the diminution of the lochia, and by the sensations of the patient. These symptoms may, however, be occasioned by the retention of coagula in the womb; which, if retained long, or if not thrown off, by means which will aid the contractile action of the uterus, may cause inflammation or puerperal fever. As tenderness may accompany severe after-pains, it is proper to distinguish between the tenderness thus produced and that which depends on inflammation; and this may be effected by ascertaining whether or no the tenderness continues in the intervals between the pains and contractions which occasion them. If it does continue, inflammation should be suspected, especially if the pulse be quick, and if the lochia has suddenly become scanty or suppressed.

24. (c) The *lochia* rarely deviates from the usual condition without exciting some degree of anxiety in the mind of the patient and physician. This discharge may *cease* a few hours after delivery, after the birth of a still-born or putrid child; and, although putridity of the fetus may be viewed as risking the healthy condition of the uterus, yet the membranes may have protected this organ, so that no unpleasant symptoms appear. The lochia may also be very *scanty*, yet of the usual duration, as when flooding has occurred; and in this case no farther mischief may appear, although a greater predisposition to some other puerperal malady is thereby developed, as puerperal fever or mania, &c. This discharge may be, on the other hand, *excessive*, either as to the quantity within the usual time, or as to the prolonged duration of it. After having decreased in quantity and changed in colour, it may suddenly increase, or become even excessive. This is usually caused by sitting up too soon, or walking about; or by the expulsion of a clot which may have obstructed the passage of the discharge through the os uteri. If the lochia change suddenly from a paler to a redder colour, or if a *red colour* return after it has disappeared, the accession of secondary hemorrhage should be dreaded and guarded against. The passage of the discharge into uterine *leucorrhœa*, which may be permanent, will sometimes occur, and ought to be prevented. The lochia may assume an *acid* and a very *offensive state*. It is then of a dark or green colour, very profuse and watery, often so acid as to excoriate the parts, and always very fetid. These conditions of the discharge are often a sign of disease, but they often also are caused by the retention of a small portion of the placenta, or of coagula, either in the uterine cavity, or in the extremities of the veins and sinuses, or by portions of the decidua which putrify and come away.

25. (d) The *bladder* and *urethra* may suffer considerably after labour, especially when protracted, and be excessively tender; and redness and tenderness may extend to the *vagina* and *vulva*. This state is often productive of distressing stranguy, sometimes with considerable fever.

26. C. OF THE MANAGEMENT OF CONVALESCENCE FROM PARTURITION.—(a) *For the natural course of recovery*, the recommendations of HAMILTON, CLARKE, SMELLIE, BURNS, CHURCHILL, and others accord in every respect, and are nearly the same as those which will be here adopted. The patient, after delivery, should be kept for some time in a state of perfect quiet. The room ought to be slightly darkened, and very few persons, except the nurse, admitted. Little or no talking ought to be permitted, unless in an under-tone, and no whispering. The conversation and demeanour of all should be cheerful; and no ill news, frightful stories, or unseasonable communications related. Mental excitement or emotion of every kind is liable to be injurious. The horizontal position must be strictly preserved, and sleep invited. After a few hours' sleep the nervous system will recover from its shock. The state of the *pulse* ought to be carefully watched, and excitement of it viewed attentively in connexion with every sign or symptom of disorder, as it is generally the first to indicate the approach of disease. "Immediately after delivery, it is proper to apply *compression* to the abdomen, by means of a broad binder. This is useful, in the first place, to fix the uterus, and secure its steady contraction; and, secondly, to encourage the contraction of the abdominal parietes. The binder should extend from the ensiform cartilage to the pubes, and be carefully applied for ten days or a fortnight." Immediately after the expulsion of the placenta, a warm napkin ought to be applied to the vulva, and changed at short intervals. "This will afford relief from the smarting pain consequent upon the passage of the child. After some hours, when the patient is recovered, the external parts should be washed with tepid milk and water, containing a small portion of spirit. This must be repeated twice a day, not only for the sake of cleanliness, but to aid in restoring the parts to their natural state."—(CHURCHILL, &c., *Op. cit.*, p. 253.)

27. The *horizontal posture* ought to be undeviatingly observed; and however the exact position may be changed, the horizontal state should never be departed from until permitted, and never until after the fourth or fifth day from delivery. The *after-pains* require such attention as is advised in the article respecting them. The *lochia* needs no farther attention than that the napkins should be changed sufficiently often, and that they be applied warm, and so as to prevent the admission of air, especially cold air, to the tender parts, and the action of the air on the internal surface of the vulva. The air in the chamber ought to be preserved in a fresh and moderately cool state, and a fire kept up in order to promote a renewal of air in the room. The bed-clothes ought only to be sufficient to afford a comfortable degree of warmth.

28. *Micturition* should be attempted as soon after delivery as may be felt to be requisite—in from five to eight hours—and it should take place as nearly in the horizontal position as possible. Dr. HAMILTON advises the patient to turn round upon her knees, by which any coagula accumulated in the vagina will readily be expelled. If micturition be neglected too long, the bladder may be paralyzed, or inflammation may attack it and extend to the peritoneum, or convulsions may be excited by its over-distension.

tion, as I have witnessed in two instances. If any difficulty in evacuating the bladder exist, a warm fomentation to the vulva, or the introduction of the catheter, will remove it. It is the more important that the urine should be voided when the patient complains of pain in the lower belly, with a desire to pass it, and when the labour has been severe or instrumental.

29. The *bowels* may remain quiet for twelve or eighteen hours after delivery; and if they are not moved at the end of this time, a dose of castor oil, or of senna, or of rhubarb may be given, and, if necessary, repeated. The frequency of repetition must depend upon the state of the bowels previously to delivery, and upon the presence of signs of fecal accumulations. Dr. HAMILTON remarks, that "unless it be unequivocally ascertained that the bowels have been regularly cleared previous to delivery, a dose of castor oil, or of aloes, with some narcotic, if necessary, ought to be given as soon as the woman has recovered from the shock of labour, and the appearance of the stools particularly examined." If indurated feces be present, the purgative should be repeated every ten or twelve hours, until the bowels are completely unloaded. When the reduction of the bulk of the uterus is tardy, purgatives are more especially required, or an enema, containing the spirit of turpentine and castor oil, may be occasionally administered.

30. If the *breasts* become hard and painful, warm fomentations, frictions with warm oil, or with a slightly stimulating liniment, and a dose of a purgative medicine are usually advised and repeated for those cases where the milk is to be discouraged, the woman not intending, or not being capable of suckling the infant. As soon as the secretion commences, the child should be put to the breast, in order to facilitate the discharge of the milk and to prevent distention. It is better, as Dr. CHURCHILL advises, to do this, even if the patient should not suckle her infant, as it will afford relief. When she is not to suckle, she ought to have every second or third day, according to her strength, till the secretion of milk ceases, and the tension of the mammae subsides, a dose of some purgative, as rhubarb or senna, with a neutral salt. She ought not to leave her bed, even to have it made, before the fifth day; and, if she be a delicate subject, she should strictly preserve the horizontal position for several days longer. Premature *excretion*, and inattention to *position* and to suitable *diet*, are the chief causes which combine with *impure air*, *foul beds and bedding*, and *mental emotions* to produce the maladies consequent upon parturition.

31. The patient's *diet* should consist chiefly of gruel, arrow-root, sago, rice, milk, whey, panada, weak black tea, with dry toast or biscuit, and very little butter for the first three or four days. When the vascular excitement attending the commencement of lactation has subsided, and no disorder is observed, broth, chicken, mutton, or other light articles of diet may be taken on the seventh or eighth day; and wine and water, preferably claret, may be allowed in a day or two afterward.

32. (*b*) *Deviations from the ordinary progress of convalescence* ought to be promptly attended to and cautiously treated.—*a*. If the *vital shock* be extreme, or even severe, small doses of opium,

with camphor, ammonia, or musk, should be frequently administered, and the quantity of each duly proportioned to the frequency of exhibition and the urgency of the case. These substances are preferable to wine or brandy, as they procure sleep, quiet the pulse, and prevent the subsequent reaction from being excessive; while the latter may occasion fever, or distressing headache, or even mania. In this emergency perfect moral and physical quietude should be preserved. As the shock subsides, suitable nourishment and restoratives are requisite.

33. *β. Increased frequency of pulse* ought always to excite suspicions and the strictest investigation. If the patient suffer from gastrointestinal irritation, the cause of frequency is thereby manifested, and blue pill, or the gray powder, with DOVER'S powder, should be prescribed, and repeated according to circumstances. If fecal matters have accumulated in the bowels, the purgatives and enemata already mentioned are required. If the quickness of pulse still continue, the states of uterine contraction and of the lochia ought to be examined, with the view of detecting the commencement of disease in the uterus or its appendages, or in the peritoneum.

34. *γ. An acrid or morbid state of the lochia* is apt to occasion irritation, excoriation, or even inflammation of the vagina and vulva, with smarting and itching. In this case extreme cleanliness, frequent bathing, warm diluent vaginal injections, lotions containing lead, or the black-wash, or the sulphate of zinc may be employed; the simply diluent injections being first used, and the others subsequently or after the lochia has become scanty, or about to disappear, lest suppression of the discharge should be produced. The injections ought to be warm, and, if the lochia be very offensive, a small quantity of erasate, or of chloride of lime, or chlorinated soda may be added. During the treatment, the *binder* above recommended should be duly and carefully applied. When the lochia becomes *excessive or prolonged*, nutritious diet, tonics, as the preparations of cinchona, or quinine or chalybeates, or the tincture of the muriate of iron, ought to be allowed after a due time from delivery has elapsed. When the discharge becomes excessive, or changes in colour after having nearly ceased, the patient should be confined to the horizontal posture. In all these circumstances, and especially when the lochia is excessive, prolonged, or likely to pass into uterine leucorrhœa, the occasional administration of an enema containing oil of turpentine, or embrocations with this substance, applied either above the pubis or over the sacrum, will be of service.

35. *V. OF THE INFLUENCES AND AGENTS FAVOURING, PREDISPOSING TO, OR EXCITING PUERPERAL DISEASE.*—The same *causes* may produce any of the acute maladies incidental to the puerperal state; the particular malady being determined by the peculiar combination of causes and of circumstances aiding the development of the effects of these causes by the constitution, habit of body, and state of the patient previous to and during the parturient process, and by the changes consequent upon delivery; by these last more especially than by others. The remarks which have been offered above on the several changes

and varying states and circumstances tending strongly to predispose the female frame to the invasion of the exciting causes of acute disease, will sufficiently show the marked liability to such disease which these changes and states create, even in the more favourable circumstances in which she may be placed. But when it is considered that, with these successive changes, various mental emotions have been and continue in operation—fear and anxiety in most cases, and the most depressing of the moral sentiments in some—these changes must be viewed as receiving therefrom the most important aids towards the development of serious morbid effects. To these, moreover, are often added the influences of diet and regimen, not always the most suitable to the successive states of advanced gestation and of parturition, and more especially to the period immediately following delivery; the still more active agency of close, impure, and miasmatic air, of foul exhalations, and of imperfect ventilation; and the contingent operations of infectious effluvia variously generated and as variously conveyed and propagated.

36. Among the poorer classes, and even among the richer in some localities, the moist, putrid, and contaminating emanations from the numerous sources with which all cities and large towns more or less abound, are productive of the more malignant of the maladies incidental to the puerperal state. These sources have been fully described, and their influence shown in the articles *INFECTION* and *PESTILENCE, protection from*. But the most malignant operation of a foul or contaminated air is shown in lying-in hospitals, where every patient which enters them, at certain seasons or times, is seized with puerperal fever, or some other acute and often fatal disease. If the wards of a lying-in hospital contain more than four beds; if these wards are placed too close to each other, if they be not lofty and ventilated by a thorough current, by open fire-places, and by fires; if they be too closely shut during cold and moist states of the air; if the discharges be not quickly removed, and the cloths imbibing the lochia be not frequently renewed; and if the bed-clothes and bedding be not perfectly clean and duly purified, the more malignant forms of puerperal disease will soon make their appearance, owing to the generation of a morbid, an infectious, and a contaminated effluvia, by puerperal females and by their discharges, in too confined and insufficiently ventilated apartments. This effluvia, when once generated, may be conveyed by the clothes, or by other media, and may infect others so circumstanced as to be contaminated by it. Of this fact I have known numerous proofs, which will be noticed in the sequel.

37. There is every reason, moreover, to believe that lying-in hospitals are not the only source of the fevers which render these institutions a greater curse than a benefit to the community; for I have seen reasons for inferring, that the foul air extricated from the numerous sources of impurity, contamination, and death with which this city and others abound, and which I have described under the heads referred to above, especially when undiluted by due ventilation, or when accumulated in a humid, still, and confined atmosphere, and when added to and acting upon the recently delivered

female, will so depress organic nervous power, and so contaminate the circulating fluids, as to develop puerperal fever of a malignant character, which may, in its turn, generate an effluvia productive of a similar malady in other puerperal females when communicated to them.

38. The contaminating effluvia, or infected atmosphere, productive of the more violent states of puerperal diseases, and the sources from which such effluvia proceeds, cannot be disputed; but its modes of invasion and operation are not quite so manifest. I believe, however, from what I have observed in the different circumstances in which this effluvia or contaminated atmosphere has been generated, that its modes of invasion and operation differ materially according to the concentration of this cause, and to the circumstances favouring its invasion in one way in preference to another. Thus, in the more concentrated state of the effluvia, as generated in the crowded wards of a lying-in hospital during a cold and humid state of the air, and when due ventilation was prevented, I have seen females without any complaint, and dead within twenty hours afterwards; and on dissection neither the uterus nor its appendages, nor the peritoneum, has presented any manifest lesion, or any change more evident than that of other organs; the chief alteration being a fluid and dark state of the blood, some congestion of the lungs, and enormous flatulent distention of the elementary canal. (See hereafter.) In these cases, which were observed as closely as I was able, I attributed the intensity of the operation of the poison to its being respired with the air, to its operation on the nervous system and blood, to its contaminating the fluids, and to its impairing not only the crasis of the blood, but also the vital cohesion of the tissues, as evinced upon dissection, even before the body had entirely cooled.

39. In other circumstances, when the morbid or poisonous effluvia appeared to be less concentrated, and to be productive of a less malignant or less rapidly fatal disease, and where there was less crowding, and better ventilation of the wards, the effects were different both as to their procession and as to their issue. The appearances after death were varied, and were most remarkable in the peritoneum, or in the uterus, or in the uterine sinuses, or in the veins of the uterus and its appendages; and, in respect of these cases, I have doubted whether or not the poisonous effluvia or emanation had invaded the frame through the respiratory organs, or by the vulva and vagina, or by both avenues. It may be viewed as a somewhat extravagant notion to suppose that an agent disseminated in, and conveyed by, the air can contaminate or infect the frame by the latter avenue—by the vagina. But if the effects of the admission of even pure air into the cavity of an abscess, and the difficulty of preventing this admission on occasions of opening psoas and lumbar abscesses, and of puncturing empyema, be duly estimated, the probability of air finding admission by the vagina to the uterus will be admitted, especially when the states of these parts for some days after parturition is considered. If, then, the air already poisoned or contaminated thus finds its way into either the vagina or the uterus—an avenue much more

patent than the opening into a chronic abscess, &c.—it will necessarily occasion, in the puerperal state, effects even more remarkable than when admitted into other cavities; for the already infected air will contaminate not only the discharges retained in these situations, rendering them still more injurious and infecting, but also the surfaces with which they come in contact, and which, as respects the uterus, resemble those of a recent wound, and, as regards the vagina, are excoriated, tender, or inflamed.

40. If the production of dangerous states of puerperal disease by this local contamination be admitted, the very intimate connexion between certain forms of puerperal fevers and erysipelas will be farther demonstrated thereby; while, on the other hand, this admitted connexion between these maladies will evince the high probability of this mode of infection and contamination. It is extremely probable, moreover, that the vital depression produced by the foul air respired by the puerperal female, or even by an infecting effluvia communicated by the clothes of an accoucheur, will so influence the state of the recently-delivered uterus as to give rise to farther changes: 1st. To imperfect contraction of the uterus and impaired tonic action, and to the slow return to the natural states of the vagina and vulva; 2d. To an altered, contaminating, or morbid state of the lochia; 3d. To a more marked disposition to the absorption of such parts of this altered discharge as may be retained in the uterus or vagina; and, 4th. To the prominent changes observed after death in the uterus, its appendages, and peritoneum.

41. VI. THE CAUSES OF THE SERIOUS NATURE OF ALL, AND THE VERY DANGEROUS TENDENCY OF SOME, PUERPERAL DISEASES, will readily appear from what I have already advanced respecting the changes experienced by the female frame in connexion with the puerperal state, and the nature of the influences and agents to which the female in this state may be exposed. The shock which the vitality of the frame has received during parturition, its manifest effects on the nervous system of some females; the predisposition to fever, mania, or convulsion which it occasions; the sudden removal of distention and of pressure; the as sudden change in the state of the vascular system, as respects both fulness or deficiency, and distribution or determination of blood; the continuance of weakening discharges and of depressing mental emotions; the alterations in the secretions and excretions; and the organic disposition of the sexual organs and adjoining tissues and viscera to experience structural change during the puerperal states—all and severally tend to impart a serious or dangerous character to the diseases which occur during these states.

42. But it is not only to the changes which the female constitution undergoes in the puerperal states that the severity of the diseases incidental to those states are to be imputed, but also to the nature of the causes which produce these diseases, and to the pathological changes which necessarily follow, if they be not arrested by prompt and active measures at an early period of their progress, and before the fluids become contaminated, and the predisposed structures disorganized or altered. The diseases, also, with which puerperal females

are affected, whether those following the operation of the common or physical causes, of those induced by the imbibition and absorption of morbid secretions or excretions, or by infectious effluvia, are seldom simple or uncomplicated—are not confined to the nervous system, or to the vascular system, or to the sexual organs, or even to several of the abdominal viscera—but extend to all the general systems, implicate both the nervous and vascular systems, change the vital and physical conditions of the blood, and affect, in a more or less prominent manner, the generative organs and peritoneal surface, which in many cases manifest the greatest amount of organic lesion. It is obvious that diseases of so complicated and general a character, affecting the chief factors of life, changing the conditions of vital fluids and of vital organs, attacking the frame at that period of existence, and in that condition, which are the most liable and open to their invasion, and in which the vital energies are the least capable of resistance, will, in these circumstances, make a rapid, a dangerous, and often a fatal progress.

43. VII. OF THE PREVENTION OF PUERPERAL MALADIES.—The remarks which I have offered above on the management, both of the natural course of convalescence after delivery and of the slightest deviations from it (§ 26–34), and on the chief causes of the most important of puerperal diseases (§ 35, *et seq.*), will have already shown what the chief means of prevention are, and that they should have strict reference to the management of convalescence and to the treatment of those early deviations, as well as to the careful avoidance of those more noxious causes to which puerperal females may be exposed. Indeed, an early and judicious treatment of the slighter deviations from the usual progress of convalescence, and avoidance of the infectious or contaminating causes, constitute the chief means of prevention that can be adopted. Yet there are certain of these causes, and more especially of the sources whence they spring, which receive insufficient attention, and until lately have received no attention at all, even from those who consider themselves expert beyond all others, especially in matters which they view as their own particular province, and as being above all the rest most important. I believe that the chief sources of puerperal fevers, particularly of their more malignant forms, are lying-in hospitals, in which not only a very large proportion of those who are received become infected, but also from which the infection is carried abroad, not solely by the females who go out, but also by the clothes of the dead and of those who recover, and by the persons and clothes of the medical attendants. The charitable would much more wisely and humanely contribute their bounty for the promotion of cleanliness and comfort in the chambers of the poor, and for enabling the objects of their bounty to be delivered in their own houses, with requisite and healthful appliances and aids, than in causing them to be transported to sources of contamination, contingent infection, and in no very small proportion, even of death.

44. The importance of removing, and of avoiding, when removal cannot be attained, the several sources of infectious effluvia which have

been mentioned under the several heads already referred to, was not the less obvious because it was so generally overlooked previously to the appearance of those parts of this work in which the injurious effects of these sources of contamination were treated of; and even now they have not received the least attention as respects their influence in causing the more important maladies incidental to the puerperal state. The nature, the number, and the concentrated agencies of these sources are now too manifest to require description; but there is at least one to which insufficient attention—or, indeed, no attention at all—has been directed, namely, the impure state of the *bedding* used by many persons of the middle classes, and of those below them, although not the poorest. The beds, consisting chiefly of feathers or wool, always of animal substances—having imbibed the effluvium and perspiration of the persons who have slept on them during many years, or even during generations, without having once undergone purification—have become more or less contaminated by the continued use; and it cannot, therefore, be a matter of surprise if, in certain occasions of prolonged occupation, and in some atmospheric conditions, an effluvium should be evolved from them productive of infection or contamination to the susceptible and predisposed puerperal female. That a contaminating effluvium is actually evolved from foul beds in these circumstances, I believe, because I have seen proofs of this cause of dangerous disease; and hence more notice should be taken of this source of human, and especially of puerperal infection, than it has hitherto received. It is not improbable that puerperal females are not the only sufferers from this cause, and that puerperal fevers are not the only diseases which may occasionally originate in this source, but also that erysipelas, typhoid fevers, and other febrile and infectious maladies may often be produced by the same causes, both in the wards of an hospital, and in the close and impure sleeping apartments and beds of the poorer classes, and even of those next above them, when the infection becomes more generally diffused.

45. II. OF THE LOCAL AND FUNCTIONAL DISEASES INCIDENTAL TO THE PUERPERAL STATE.—Several of these diseases are treated of under distinct heads. *Phlegmasia dolens*, *puerperal convulsions*, *uterine hemorrhages*, and *puerperal mania* have separate articles assigned to them. (See arts. CONVULSIONS, § 27, *et seq.*; HEMORRHAGE, UTERINE, and INSANITY, PUERPERAL). The disorders incidental to the *mamma* and to the secretion of *milk* are considered in the articles LACTATION and MAMMÆ. It therefore only remains for me to notice at this place certain lesions of the sexual and adjoining organs which are apt to occur, during and subsequent to parturition, and the *fevers* to which puerperal females are liable.

46. I. STRUCTURAL LESIONS CONSEQUENT UPON PARTURITION.

CLASSIF.—IV. CLASS, IV. ORDER (Author)

47. A. SANGUINEOUS TUMOUR OF THE VULVÆ. *Sanguineous tumour of the labia*, CHURCHILL.—*Sanguineous extravasation into the labia*, CROSSE.—*Effusion of blood into the cellular tissue of one or of both labia* is of rare occurrence. It has been observed and described by MACBRIDE, MAIT-

LAND, DENMAN, BURNS, MERRIMAN, DEWEES, HAMILTON, CROSSE, and others.

48. The effusion may not be limited to the vulva, but may extend into the pelvis, and downward to the perinæum. It may occur during labour, previously to the delivery of the child, as in Dr. MAITLAND's case, but much more frequently immediately afterward. The tumefaction is generally sudden, and increases rapidly. The size varies much, and has even reached that of a child's head. Dr. CHURCHILL, quoting M. SCHEDEL, states, that as much as six or seven pounds of blood have escaped.

49. a. It is *caused* by the rupture of some vessel or vessels, by the pressure of the child's head while passing through the pelvis; and most probably the ruptured vessels have been in a varicose or disordered state previously. "Dr. BURNS supposes some of the vessels of the nymphæ to be ruptured; Dr. DEWEES, that the vessels of the vagina give way; and Drs. DAVIS and CAMPBELL, the pudic vein." But there is not sufficient reason to assign it to any particular vessel. It most probably arises from the rupture of several small varicose veins. This lesion has usually followed natural labours.

50. b. *Symptoms*.—The patient's attention is first directed to it by the swelling of the labia, and by a sense of weight and of bearing down. On examination, one or both labia are found distended, sometimes enormously, and the labium everted, so that the tumour appears partially covered by the mucous membrane. The colour is livid, or nearly black. The parts are extremely tender, and the pain is very great. The tumour increases rapidly until it covers the vulva and the perinæum. Dr. CHURCHILL states, that a considerable degree of fever is present; the pulse becomes quick, the skin hot, and the head pained; there is sometimes, also, delirium. Retention of urine, from the pressure of the tumour on the orifice of the urethra, increases the distress. The patient lies on her back, scarcely able to move, with the thighs widely separated, unable to bear even the pressure of the bed-clothes (DEWEES). After a few hours, relief is obtained by the rupture of the labium, which always takes place on its inner surface, and by the discharge of blood. A small portion of this surface begins to slough, and part of the blood escapes; but, some coagula remaining, the wound becomes offensive from their decomposition. The slough and remaining coagula are afterward thrown off, and the parts generally heal by degrees.

51. The rupture of the tumour rarely takes place during the labour; but in this case, as well as in others where it occurs before the blood is coagulated, the hemorrhage is so great as to occasion fainting, or even death, as in the instances adduced by PHILLIPART, CROSSE, NÆGALÉ, SCHEDEL, and others. If the tumour be very large before the birth of the child, it proves so serious an obstacle as to require surgical interference. This tumour cannot be mistaken for *hernia*; the rapidity of its appearance, the period of its occurrence, its size and colour sufficiently distinguishing it from *hernia*. It has been mistaken for the distended membranes, and punctured with this idea; but the bag formed by the membranes can be isolated from the labia and traced up to the os uteri. Besides,

this tumour generally does not occur until after delivery.

52. *c.* The treatment is evidently to give as early an issue as possible, after the blood has coagulated, to the contents of the tumour. If the risk of hemorrhage before coagulation be considered so great as to prevent an opening being sooner made in the tumour, the urine ought to be drawn off, and an enema, with an ounce or an ounce and a half of oil of turpentine, administered. In no case should this enema be withheld, and rarely ought an incision into the labium be delayed longer than two or three hours. When the small coagula infiltrating the cellular tissue causes an offensive discharge, then lotions with vinegar, water, and creasote, or with chloride of lime, or charcoal poultices, may be employed. If hemorrhage continue, or return, the turpentine elyster should be repeated, and compresses, moistened with oil of turpentine, applied. The bowels ought to be kept open, and the febrile and other symptoms treated according to general principles and the peculiarities of the case.

53. *B. LACERATION OF THE PERINÆUM.*—This accident is varied in extent. Where it is slight, it may not materially interfere with the comfort of the patient, but when it is extensive it is a cause of almost constant distress. It occurs most frequently during first labours.—*a.* "The exact situation and extent of the rupture vary with the cause and the circumstances of the case. 1st. It may commence at the anterior border and extend to the sphincter ani, and this is the most frequent extent. 2d. The rent may involve the entire perinæum, and extend through the sphincter ani, laying the cavities of the rectum and vagina into one. 3d. The central space of the perinæum is sometimes ruptured, leaving the anterior edge and the sphincter ani untouched." Both the child and the placenta may pass through this central laceration, or completely *per anum*. 4th. The recto-vaginal septum, sphincter ani, and part of the perinæum may be torn, so as to permit the passage of the child, leaving the anterior portion of the perinæum entire.

54. *b.* The causes are deviations from the ordinary mechanism of parturition; malconformation of the passages, or of the soft parts; exostosis or tumours in the pelvic cavity; excessive violence of the pains, and the too rapid passage of the head of the fœtus; great breadth, or extreme rigidity, or great weakness of the perinæum; malposition of the child's head, or malpresentations; and mismanagement or want of care, especially when instruments are used. Thus it will appear that this accident cannot always be prevented.

55. *c.* The symptoms and consequences of laceration depend upon the extent of it. If the injury be slight, no ill effects may probably result; but if it extend to the sphincter, the patient complains of want of support, and is liable to proclivita of the womb. If the recto-vaginal septum be torn, the state of the patient is most distressing. The feces, for some time at least, pass through the vagina involuntarily; and the utmost attention to cleanliness is required, but cannot always prevent most distressing annoyances. When slight, the rent commonly contracts, and heals without interference, after a short time. Even when the

recto-vaginal septum is torn, partial union may take place, and leave only a fistulous opening. Dr. BURNS remarks, that a valve may ultimately be formed, so that the patient may be partly relieved of her infirmity. But frequently the lochial discharge passing over the wound prevents the natural process of cure, and the torn surfaces become callous, or degenerate into ulceration in consequence.

56. *d.* The prevention and treatment of this accident are fully discussed in works on midwifery and surgery. To these I must refer the reader. But I may remark, that slight cases require only cleanliness: the part will heal of itself, and the patient may not even suspect what has occurred. Even when the laceration is more considerable, all that may be required is, to give at first one or two active purges, and afterward allow the bowels to become costive, to observe strict cleanliness, and to keep the patient in one position, so as to preserve the edges of the wound in contact. If these means do not succeed, a binder may be passed around the hips, and a pad on each side of the perinæum, so as to preserve the edges of the wound in apposition. Sutures of different kinds have been employed, and have succeeded in rare instances. After sufficient purging, it may be advisable to give opiates, so as to cause costiveness for a few days, and thereby to aid in the restoration of the parts. The catheter must be passed twice or thrice daily, and means used to absorb entirely the discharge. The diet should be spare, and chiefly farinaceous. Perfect quietude is necessary. In the various circumstances in which a failure, partial or complete, of the above means may occur, the assistance of the surgeon and mechanist will be required.

57. *C. RUPTURE OF THE UTERUS AND VAGINA.*—This fatal occurrence may take place during parturition, during pregnancy, and at an advanced period of life, of course unconnected with pregnancy; this last being the rarest. Dr. CHURCHILL adduces statistical details of this accident, from which it appears that Dr. COLLINS met with thirty-four cases out of 16,654; that sixty-five cases occurred in an aggregate of 42,768 patients, or about one in 657. Dr. BURNS says, that it happens about once in 940 cases. It is not so often met with in first as in subsequent pregnancies. Of seventy-five cases, nine occurred in the first pregnancy, fourteen in the second, thirteen in the third, and thirty-seven in the fourth and subsequent pregnancies.

58. *a.* Causes.—1st. During gestation, it may arise from that form of extra-uterine pregnancy called *interstitial fatation*; the ovum being retained, in passing the Fallopian tube into the uterus, between the uterine fibres, where, as it grows, it occasions the absorption of that portion of the uterine parietes, which at last give way, and allows the fetus to pass into the abdominal cavity. Rupture of the uterus may also proceed from disease, as from inflammation, softening, or suppuration of a portion of the walls of the organ; or it may be produced by accidents, blows, falls, &c. It may even occur without any assignable cause, unless it be then occasioned, as Dr. BURNS supposes, by irregular action of the fibres of the uterus.

59. 2d. During parturition, it may also arise from pre-existing disease, and especially from

any one of the usual consequences of inflammation. A portion, also, of the uterus may be atrophied, softened, or thinned by the pressure of the child against it, or by pressure of some part of the abdominal or pelvic parietes, so as to yield during the uterine contractions of parturition. DEPARQUE mentions scirrhus of the uterus as one of the causes of rupture; but this is doubtful. When partial inflammation of the uterus has existed during gestation (§ 58), then the laceration has usually corresponded with the situation of the previous pain marking the seat of inflammation. There can be no doubt that a perfectly healthy uterus is rarely or never ruptured. In one case M. MALGAIGNE attributed the rupture to the administration of ergot of rye.

60. *b.* The *period of labour* at which rupture may occur varies; "it may be at the beginning, before the rupture of the membranes; during the passage of the head through the pelvis; or in the moment when the child is delivered." Narrowing of the upper outlet may give rise to it; or any other mechanical obstacle opposing the actions of the uterus; or even oblique positions of the womb. The age of the patient has but little influence in predisposing to rupture.

61. *c.* The rupture may only be *partial*, some one of the tissues of the uterus giving way either previously to or during labour, probably owing to antecedent disease, or to peculiarity of structure. The peritoneal coat alone may be torn, or the muscular coat may be ruptured, the peritoneal covering remaining uninjured. Dr. COLLINS met with nine cases of this description. Although the extent of lesion is less in such instances, yet Dr. CHURCHILL considers it to be equally fatal. And as in other forms of rupture, it may be caused by external injuries, by excessive movements of the child, by overdilatation, &c.

62. Violence in turning the child may cause rupture; "and it may accompany this operation, in certain states of the cervix uteri, without any fault of the operator." Rigidity of the os uteri, or imperforation, may also occasion laceration. Several instances are recorded in which the os uteri was torn completely off during labour. Pressure at the brim of the pelvis, rendering the cervix uteri thinner or softer than natural, and more easily torn, has been assigned for this occurrence.

63. *3d.* At an *advanced period of life* the structure of the cervix uteri is more or less changed, becoming dense, cartilaginous, and the canal reduced in size, or even obliterated. The outlet for the escape of secretions accumulated in the uterine cavity is thus closed; and if the quantity collected be sufficient to distend the organ, some portion of the walls experiences absorption and thinning, or inflammation and softening. Thus an opening or perforation may be made by absorption, or by rupture, into the peritoneal sac.

64. *d.* On *dissection*, the torn edges, and the parts immediately adjoining, usually exhibit marks of disease when the rupture has proceeded from this cause, the laceration in such cases occurring in any part of the organ. "When the rupture is the result of mechanical causes, it generally takes place near the cervix, and involves both the uterus and vagina,"

the part which gives way being usually near the union of the cervix with the vagina. The wound is commonly transverse. Of twenty-three cases, Dr. COLLINS found one on the right, one on the left side, eleven posteriorly, and ten anteriorly. The structure of the uterus is hardly altered—is firm in texture, and natural in colour, except a few ecchymoses. The edges of the laceration are jagged or uneven. In very rare instances the bladder has also been ruptured. When the *peritoneal surface* of the uterus has alone been torn, several small lacerations, resembling scarifications, from a quarter to half an inch in length, and one or two lines in depth, are found. They are attended by the effusion of blood in the peritoneal cavity, and by the usual appearances and products of peritonitis, which are caused by the effused blood and the injury. When the *muscular substance* is alone torn, there may or may not be found evidence of pre-existent disease. The peritoneal covering is generally inflamed, and blood is found effused in the cavity of the uterus. Laceration of the *cervix uteri* is accompanied with a bruised appearance; its edges are ragged and uneven, and the parts immediately adjoining red and swollen. The connexion between the cervix and vagina is not compromised. In cases of rupture of the uterus in *old persons* (§ 63), the viscus is rather perforated than ruptured; the changes caused by the contents, and the softening and thinning of a portion of the parietes, appearing more like perforation than rupture. *Peritonitis* always follows rupture of the uterus if the patient survive the shock.

65. *e.* *Symptoms.*—The symptoms vary somewhat with the extent of the rupture, according as the peritoneal or the muscular coat is singly torn. The circumstances which may suggest fears of rupture are the occurrence of partial inflammation of the uterus during gestation, and the existence of violent labour-pains in patients with a narrow or mal-formed pelvis. "Rupture of the uterus and vagina is marked by an acute, sudden, and intolerable pain like cramp; a sense of some part bursting, giving way, or tearing, with an audible noise, according to the testimony of the patient; the suspension of the labour-pains; hemorrhage from the vagina; and by a rapidly succeeding state of collapse." (CHURCHILL.) All these symptoms may not be observed in some cases, but the pain and collapse are never absent. When one of the coats alone is torn, the labour may continue if it be the peritoneal coat, and there may be no hemorrhage. In such cases, Dr. RAMSBOTHAM remarks that the symptoms of actual rupture of the uterine structure are observed in a diminished degree, excepting the escape of the child.

66. Rupture of the uterus is always attended by continued and extreme pain; nausea and vomiting supervene—at first of the contents of the stomach, then of a greenish, and lastly of a dark or coffee-ground-like matter; the countenance becomes pale, anxious, and ghastly; the surface and extremities cold and clammy; the pulse rapid, small, and weak, or fluttering and irregular; respiration is hurried, panting, and anxious, with a desire of fresh air; and hemorrhage takes place from the vagina, varying much in quantity. The shock or collapse character-

izing these cases is owing more to the nature and severity of the injury than to the amount of hemorrhage which may follow, although this is sometimes very considerable; but both conditions contribute to this result. When the rupture is complete, the child passes through the opening into the abdominal cavity, either partially or wholly, where it may be felt through the abdominal parietes, and the efforts at expulsion cease. If the presentation was within reach before the accident, it cannot now be ascertained. Dr. CHURCHILL refers to instances of a loop of intestine having passed through the rupture when complete, and become strangulated. The state of collapse may continue for some time, if it do not prove fatal. But at length reaction takes place to a certain amount, and the usual symptoms of peritonitis appear: exquisite tenderness, pain, and flatulent distention of the abdomen; pulse small, hard, rapid, and, lastly, weak; decubitus on the back, with the knees drawn up; hurried respiration, anxious and collapsed countenance.

67. *f. The terminations of ruptured uterus are, 1st. Death a few hours after the shock, or after delivery; 2d. Death from peritonitis; 3d. Death from consecutive lesions; and, 4th. Recovery.* In by far the greater number of instances the accident proves fatal. The aggregate of cases observed by SMELLIE, J. CLARKE, MERRIMAN, M'KEEVER, RAMSBOTHAM, COLLINS, and BEATTY, amounting to sixty-eight, furnished only six recoveries. OSIANDER, VELPEAU, and CHURCHILL quote several cases of recovery; but instances are very rare in which recovery has taken place when the fetus has remained in the peritoneal cavity. (DUPARQUE.) In cases of interstitial foetation, also, patients have very rarely survived both shock and consequent inflammation. In all cases, therefore, of ruptured uterus the prognosis is very unfavourable.

68. *g. Diagnosis.*—The sudden and acute pain, the cessation of labour, the collapse, and the recession of the child, sufficiently indicate the nature of the mischief. When, however, the rupture is partial, the diagnosis is much more difficult. The sudden pain, collapse, and consequent peritonitis are the chief symptoms of rupture of the peritoneal coat; the pain, collapse, cessation of uterine action, and vaginal hemorrhage being the principal indications of rupture of the muscular coat. The sudden occurrence of peritonitis in *old women* may excite suspicions of perforation or rupture of the uterus, but certainty can be arrived at only by a *post-mortem* inspection.

69. *h. Treatment.*—When rupture of the uterus is recognised, the propriety of immediate delivery cannot be disputed. Common sense and experience, as evinced by the results of recorded cases, support this practice. When the os uteri is undilated, instant delivery cannot be effected; but the measures to be adopted on this emergency, as well as in others connected with the delivery, especially when the child has passed through the rent into the abdominal cavity, come not within the scope of my work. The means which should be administered during the continuance of the vital shock, or collapse, are camphor, ammonia, and opium, in such doses as may be just sufficient to support the powers of life without inducing inordinate reaction. If peritonitis supervene, calomel,

camphor, and opium; terebinthinate embrocations applied over the abdomen; opium in large doses, and the other means recommended in cases of *inflammation of the PERITONEUM* (§ 138, *et seq.*), should be prescribed, bearing, however, in recollection that the large loss of blood usually occasioned by the rupture, as well as the shock sustained by the vital powers, prevents either depleting or depressing measures from being too freely employed.

70. *D. INFLAMMATION OF THE VAGINA.*—Inflammation of the vagina may occur independently of the puerperal state, or it may arise from specific causes, or infection, as shown in the article VAGINA.—(a) It is of frequent occurrence after delivery, in various grades of severity. It may consist merely of slight soreness or excoriation, or irritation, and follow an ordinary or natural labour, and speedily subside, unless it be prolonged or exasperated by an acrid state of the lochia. When, however, the head of the child has remained a long time in the pelvis, pressing on the soft parts, or when the narrowness of the passage has created great difficulty, or when the presentation has been unnatural, or when instrumental aid has been required, the vagina is then liable to experience most severe inflammation, the consequences of which may be most serious.

71. (b) The symptoms generally commence with a smarting pain, more severe than that usually following delivery, soon passing into a sense of painful heat and scalding, extending from the external parts up the vagina. There is also a feeling of fulness and weight in this situation. On examination, the external parts appear swollen and bruised, with increased heat, and acute pain or tenderness, when touched. On averting the labia, the vagina presents large rugæ of a bright red colour. At first the discharge from the inflamed surface is scanty, but it afterward is purulent, or pus may be detected, mixed with the red lochial discharge. If the discharge have become more colourless, the puriform secretion from the vagina renders it more opaque. With the local increased action more or less of symptomatic fever is present; and in the more severe cases this fever may assume a very serious aspect.

72. (c) The terminations are sometimes serious. The slighter cases, or those which receive prompt and judicious treatment, usually terminate in *resolution*. The decrease of pain, and of the local and constitutional symptoms, is the chief indication of this issue. *Suppuration and ulceration* are not infrequent. When the injury causing the inflammation has been severe, or the attack violent from the first, suppuration advances rapidly, is attended by a copious puriform discharge, and, in the course of a very few days, is followed by the appearance of a number of sloughing ulcers, or, rather, of several partially detached portions of sloughing mucous membrane. As these separate, the parts which they covered appear deprived of membrane. If the *sloughing ulceration* be more severe, the coats beneath the mucous coat may be invaded; and it is then not uncommon to find the posterior part of the neck of the bladder attacked, and even an opening formed in this situation—a *vesico-vaginal fistula*; or to find a similar sloughing ulcer into the rectum—or a *recto-vaginal fistula* to be formed. When slough-

ing ulceration appears, the greatest care may not succeed in preventing these consequences from occurring.

73. *Gangrene* may rapidly follow when the pressure on the parts has been prolonged or excessive. In these cases the separation of the sloughs is generally followed by vesico-vaginal fistula; more rarely by recto-vaginal fistula. In 1845, a lady who had experienced the most unaccountable neglect while in the care of a surgeon in the East Indies, but who was perfectly well formed, came to London for the advice of the author and the late Mr. LISTON. Most extensive recto-vaginal and vesico-vaginal fistulae co-existed in her case. She had been a strong and healthy person previously to her protracted confinement in the East. When she came to London, the urinary bladder, the vagina, and the rectum formed a single cavity. The case was far beyond any measures, excepting mechanical aids, and strict attention to cleanliness.

74. (d) *Treatment*.—The usual antiphlogistic means, appropriate in kind and extent to the violence of the inflammation, and the habit of body and constitution of the patient, are required at an early stage. Dr. CHURCHILL has found *tartar emetic*, conjoined with a saline aperient, of great use. It should be given so as to nauseate without producing vomiting. "The external parts ought to be well fomented two or three times a day; and, during the intervals, a large poultice may be applied over the vulva. Twice or thrice daily, also, the vagina should be syringed with tepid milk and water, or a weak solution of acetate of lead. After the sloughs have separated, a careful examination should be made every second day, to ascertain the progress of healing; and when the surfaces begin to be covered with new membrane, we must take measures for preventing the formation of cicatrices. This can be done only by the repeated introduction of bougies, and the best kind are tallow or wax candles. At first a small-sized one should be oiled and introduced night and morning, and allowed to remain a quarter of an hour. Afterward, as the tenderness diminishes, the size of the candle should be increased; and it ought to be introduced oftener and retained longer. The warm injections should be continued, and the milk and water may be changed for some slightly astringent fluid." (CHURCHILL, *Op. cit.*, p. 281.) When sloughing ulceration or gangrene exists, a restorative or tonic treatment, and light, nutritious diet, are required. The unfavourable consequences of these changes—*vesico-vaginal* or *recto-vaginal fistula*—are sometimes remedied, when not very extensive, by surgical treatment. For the measures which may be attempted for these distressing lesions, I must refer the reader either to surgical works, or to the systems of midwifery practice referred to hereafter, and more particularly to Dr. CHURCHILL's work. (See art. VAGINA for other lesions not necessarily proceeding from the puerperal state.)

75. *E. INVERSION OF THE UTERUS*.—*The inside of the uterus may be turned out, and either drawn or pushed down into the vagina.* It may take place in different degrees, and form what has been called, 1st. Simple depression; 2d. Incomplete inversion, when the fundus uteri is

merely engaged in the orifice; and, 3d. Complete inversion, when it protrudes from the vagina, with the mouth turned upward. The vagina, in this latter case, is also partly reversed, so that the tumour is often of considerable length. When the inversion is only partial, the tumour is retained altogether, or chiefly within the vagina, the fundus protruding in part through the os uteri.

76. (a) *Symptoms*.—The patient with inversion of the uterus feels severe and obstinate pain, accompanied with bearing down efforts, by which a partial inversion is sometimes rendered complete. She is very weak; her countenance is pale and anxious; and her pulse is feeble, small, or almost imperceptible. Hemorrhage is generally present, and is often most profuse. It is frequently scanty, or absent, when the inversion is complete; although a very partial inversion may be attended by a fatal discharge. A sense of dragging at the epigastrium, or of a dragging downward of the bowels, is usually present; and fainting and convulsions may occur even when the hemorrhage is trifling. These symptoms cannot fail of exciting suspicions of inversion, which will be readily ascertained on examination; the womb protruding like a mass of flesh, and no uterine tumour being present in the hypogastrium.

77. (b) *Causes*.—Inversion is produced by pulling the cord in endeavours to remove the placenta, which may even adhere when the uterus is pulled down; but it is generally separated; or it is caused by the sudden expulsion of the child, the cord being short or entangled about the child, the fundus receives a jerk, and is thereby inverted. Dr. BURNS thinks that great pressure or strong contraction of the abdominal muscles on the fundus uteri may cause depression of the fundus, in a cup-form, and encroach on the uterine cavity. This may rectify itself, but it may increase and pass on to complete inversion some time after delivery. An incomplete inversion, as well as the complete, may become chronic, and occasion incurable fluor albus, and even hemorrhage.

78. (c) *Inversion terminates* in different ways: it may be rapidly fatal by hemorrhage, or by syncope, or by convulsions; or it may be slowly fatal by inducing over-distention of the bladder, or inflammation, and various consequent changes. After severe pains and expulsive efforts, the patient may survive, or even partially recover, from the immediate injury; the uterus may slowly diminish to its natural size, become chronic, and cause little inconvenience; or it may discharge fetid matter, and give rise to frequent debilitating hemorrhages, with copious mucous discharge in the intervals; or hectic or pulmonary symptoms may come on, and the patient ultimately sink.

79. (d) *The treatment* consists in reducing the inversion, if it be discovered sufficiently early. This is to be done by first pressing the uterus, if it have protruded without the vagina, within this passage. The tumour should be grasped cautiously in the hand; and, while it is compressed, the most prominent part of the fundus ought to be pushed up in the direction of the axis of the uterus. If reduction is accomplished, the hand should be kept within the uterus, so as to excite contractions, which will

detach the placenta, if it still adhere. Even after the reduction, when the patient is apparently doing well, she may be seized with a fit, and die. But she generally remains long weak if she recover.

80. If inversion have not been early discovered, it is always much more difficult, and sometimes impossible, to reduce it. The obstacle is the contracted state of the os uteri. It may not admit of reduction, even after a few hours from its occurrence; and if it have become much more chronic, it is not prudent to make the attempt, as violent or dangerous convulsions may be produced thereby, and the uterus is often so swollen and inflamed as to render reduction impossible. The *chronic state of inversion* is considered under the head UTERUS, as it does not strictly belong to puerperal maladies.

ii. THE SPASMODIC AND NERVOUS AFFECTIONS OF THE PUERPERAL STATE.

CLASSIF.—II. CLASS, III. ORDER (Author).

81. The nervous and spasmodic diseases of puerperal females are *convulsions*, *mania* or *insanity*, *hystericalgia*, *paralysis*, and various irregular *spasmodic* and *nervous affections*, which seldom assume any precise or definite form. The first and second of these are considered in separate articles; the others will be briefly noticed at this place.

82. A. HYSTERALGIA.—(a) This *painful affection of the uterus* occurs soon after delivery; but it is more continued and severe than the usual *after-pains* (which see). It is characterized by severe pain in the back and hypogastrium, by sickness, faintness, and a feeble, or sometimes quick pulse. These sensations may or may not be attended by the expulsion of coagula, or by a sense of severe bearing down. It not improbably is sometimes occasioned by some malposition of the uterus consequent upon delivery. It is often connected with obstruction of the lochial discharge, which obstruction is probably caused by the painful affection of the uterus. Hystericalgia is most apt to occur after a severe or tedious labour. It may not appear until the third or fourth day, or when the patient has got up too early to have the bed made. It seems to be caused by an irregular spasmodic action of the muscular fibres of the organ, the spasmodic action and the altered sensibility sometimes extending also to the bowels.

83. (b) The *symptoms* of hystericalgia vary with the extension of these morbid states to parts adjoining the womb and its appendages. The suddenness of the attack; the absence of rigours or chills; the greater severity of the pain than that attending inflammation; the suddenness of the remission or cessation of the pain, and generally the absence of tenderness or of increased suffering on pressure, chiefly serve to distinguish this affection from inflammation of the uterus.

84. (c) The *treatment* consists of the administration of a purgative clyster with turpentine, castor oil, and camphor; and, after the bowels have been freely evacuated by these, or by a repetition of them, or by a draught containing half an ounce each of castor oil and turpentine, an opiate may be given, or may be administered in an enema. Terebinthinate fomentations or embrocations should also be applied, suffi-

ciently warm, over the hypogastrium; and warm or camphoretated diaphoretics and opium, or henbane, may be given, to equalize the circulation and procure a free respiration. Warm cloths soaked with oil of turpentine, and kept applied over the seat of pain, also will seldom fail of procuring relief. The abstraction of blood is rarely required, unless the affection be actually inflammatory, as evinced by increase of pain on slight pressure, by the states of the skin and urine, and by the pulse.

85. B. VARIOUS OTHER NERVOUS OR SPASMODIC AFFECTIONS sometimes appear in the puerperal state, especially in hysterical, delicate, or nervous females, and are evidently owing to the effects produced by uterine action and the vital shock upon the organic and cerebro-spinal nervous systems.—(a) *Palpitations of the heart* are not infrequent soon after delivery in the temperaments just mentioned, especially after considerable loss of blood, and upon any alarm. The patient experiences a violent beating not only at the præcordia, but also in the epigastrium and in the head, sometimes with dyspnoea, or short panting respiration. She is alarmed, apprehensive of dissolution, and her fears aggravate the symptoms. As the attack passes off, languor, depression, or a sense of sinking, or profuse perspiration, and flatulent distention usually supervene, and after a time the disorder subsides.

86. (b) *Hysteria* is not uncommon, in some form or other. It may occur with dyspnoea, or with syncope, with hiccough, or with pains in the side or abdominal muscles, &c., and is generally aggravated, if not excited, by the secretion of air into the alimentary canal. The dyspnoea is seldom attended by cough, and is owing chiefly to exhausted power of the respiratory muscles, and sometimes to either too great or too little tightness of the abdominal bandage, the abdominal muscles and floating ribs being thereby too much compressed and embarrassed in the one case, or insufficiently supported in the other. When the *dyspnoea* is owing to an affection or *spasm of the diaphragm*, it is felt most on inspiration, and pain is often complained of in the back or sides, or pit of the stomach, with a feeling of suffocation, sharp pain sometimes darting across the lower part of the thorax, and with a very rapid weak pulse. This affection of the diaphragm usually occurs a few hours after delivery, and is always sudden in its accession and departure. It may readily be distinguished from pleurisy by these circumstances, and by the slower accession of pleurisy, which is usually accompanied with shivering or chills, and which very rarely or never appears so soon after delivery.

87. (d) *Colic* may occur within a few days from delivery. It usually attacks suddenly, and in the evening; but it is not preceded by shivering, although it is sometimes attended by sickness or vomiting. The pulse is at first slow or natural, but it soon becomes frequent. The pain is remittent or intermittent, but commonly subsides altogether after some hours, when judiciously treated. If the irritating cause be not soon removed it may induce inflammation. *Cramp of the stomach*, or spasmodic gastrodynia, may occur during the first fortnight or three weeks after delivery. Its attack is always sudden, the suffering extreme

and the danger great in delicate or exhausted females. It is often attended and aggravated by flatulence. It requires decided and prompt treatment.

88. (c) Females who have been subject to the more obstinate and complicated forms of hysteria, and especially to *spinal irritation*, or to affections reflected from the spinal chord or roots of the spinal nerve, often experience various nervous disorders, either immediately after, or at more distant periods from delivery. Soon after the expulsion of the placenta they feel urgent *sinking* or debility, with a sensation and dread of flooding, although neither internal nor external hemorrhage exists. In the more extreme cases, if stimuli be not administered, the patient may suddenly die, without any other obvious cause than the *sinking* or *exhaustion* consequent on the shock of parturition. These severe cases of sinking not only may affect the weak and delicate, or those weakened by flooding, or by greater losses of blood than the state of the vascular system can well sustain; but sometimes even fat, plump, and apparently strong females may be placed in jeopardy by these attacks. In other instances, the sinking is followed by violent determinations of blood to the head, threatening phrenitis, or puerperal mania, or even passing into either, or into lethargy, coma, or apoplexy. Fat, plump, and pale females are even more liable than others to experience these dangerous forms of nervous sinking, owing to their deficiency of vital power and resistance, and the states of the blood and vascular system; and in them nervous and vascular reaction are more rare.

89. (d) Partial or even complete *paraplegia* sometimes occurs after delivery, although the labour may have been easy or natural. The head is unaffected, but pain or weight is felt in the back or loins, occasionally with retention of urine. The palsy exists in various degrees, but it generally disappears after a few weeks, when the treatment is judicious. A more severe and protracted form of partial paraplegia occasionally follows severe, protracted, or instrumental delivery. In these cases severe pain is complained of in the back and loins, with disordered secretion and excretion of urine. In most of these states of paraplegia there is either increased effusion of serum from the membranes of the spinal chord, with congestion of these membranes and of the cord itself; or, what is more probable, extreme congestion, also, of the venous sinuses external to the sheath, in the lumbar and dorsal regions of the spine. *Hemiplegia* is not more frequent in lying-in than in other females.

90. (e) *The treatment of these several affections* is generally successful if it be prompt and efficient.—a. *Palpitations of the heart* (§ 85) require the administration of antispasmodics with anodynes or narcotics—of HOFFMANN'S anodyne with small doses of opium or henbane; or of the boracic acid with camphor and opium, or henbane; or with the ammoniated tincture of valerian, with either of these narcotics. When the paroxysm has been relieved by these, the antispasmodics should be conjoined with tonics and aperients, and change of air, preferably to the country or to the sea-side, ought to be recommended.

91. *β. The hysterical affections* (§ 86) are re-

lieved by the remedies just now enumerated, more especially by the ethers, valerian, ammonia or camphor, and opium; and if dyspnea be present, the state of the abdominal bandage should be examined and adjusted. If the symptoms be aggravated by flatulence, as they often are, ammonia or magnesia may be given with anti-spasmodic stimulants and warm terebinthinate embrocations, or epithems applied over the epigastrium. When the hysterical affection assumes a *colicky* form (§ 87), from two to four drachms of oil of turpentine may be given with half an ounce of castor oil, and a drachm of tincture of senna, on the surface of an aromatic water; and the same remedies, in increased doses, administered as a clyster, if the bowels are not freely evacuated in six hours. After the evacuation of the bowels a full dose of opium, or of the compound soap pill will be given with benefit. If *flatulence* still continue, ammonia or magnesia, with gentle tonics, or the fetid spirit of ammonia or the compound galbanum pill, may be prescribed at intervals. If the colicky symptoms assume the form of *cramp of the stomach*, or severe *spasmodic gastrodynia*, the patient is placed in jeopardy, especially if it occur within a fortnight or three weeks from delivery. A draught containing a full or even a very large dose of laudanum, with camphor and ether, or with musk, or the compound spirit of ammonia, ought to be immediately given, and the warm terebinthinate embrocation, or a mustard poultice, be applied over the epigastrium.

92. *γ.* For those states of distressing *sinking* following parturition (§ 88), Dr. BURNS advises about thirty drops of laudanum, and afterward small doses of wine or brandy, or of compound spirit of ammonia, or ammoniated tincture of valerian, taking care not to give stimuli too freely, lest cerebral affection be thereby excited. Musk or camphor with opium is generally beneficial in these cases; and light nourishment ought not to be overlooked, as not a few of these cases arise from inanition, or the prolonged privation of requisite food and restoratives. If *phrenitic* or *maniacal symptoms* supervene, the treatment must depend upon the habit of body and strength of the patient. Vascular depletions, general or local, cold applications to the head, active purgatives, and terebinthinate enemata, external derivation and irritation, and the other measures advised for cases of *Puerperal Mania* (see INSANITY, PUERPERAL, § 55, *et seq.*) should be employed.

93. *δ.* The occurrence of *paraplegia* in the puerperal state requires strict attention to the urinary functions and free purging, large doses of purgatives being sometimes necessary. Cupping or leeching near the spine may be requisite. Terebinthinate embrocations may also be applied in the course of the spine, and if these prove not of service, repeated blistering or open blisters may be directed, and the other means advised when treating of paraplegia (see art. PARALYSIS, § 215, *et seq.*) may be adopted. Three cases of this disease in the puerperal state have come before me, and have proved both obstinate, and afterward associated with amenorrhœa. In one which had been of long standing, the amendment was slow. As soon as the patient is able to move the lower extremities, she should endeavour to use them as

much as possible, and persist in the use of derivatives, both internal and external, of frictions, and of rubefacients.

III. THE Milder Fevers INCIDENTAL TO THE Puerperal State.

CLASSIF.—III. CLASS, II. ORDER (*Author*).

i. EPHEMERAL FEVER.—WEED.—PUERPERAL EPHEMERA.

94. DEFIN.—*Chills or shiverings during early convalescence from parturition, followed by headache, pain in the back and limbs, thirst, rapid pulse, terminating with profuse perspiration and cessation of fever, generally in from twenty-four to forty-eight hours.*

95. A. *Causes*.—The increased sensibility, susceptibility, and irritability of puerperal females give rise to febrile attacks upon exposure to comparatively slight causes, especially when the temperament is nervous or irritable, and the constitution is delicate. These states of *predisposition* are, however, much heightened by the changes in the vascular system, and in the blood itself, consequent upon pregnancy and parturition; and these, moreover, are associated with the predisposed conditions of the uterus, mammae, and intestines, always present in these cases. The *exciting causes* are, commonly, exposure to cold, irregularities of diet, fatigue, exhaustion, want of rest, mental emotions, inattention to the state of the bowels and indigestion, getting up, or leaving the bed, or changing the apartment too soon; accumulations of morbid secretions and excretions in the biliary organs and bowels, &c.

96. B. *Symptoms*.—On the approach of the disease the patient is languid, yawns frequently, and experiences a sense of cold in the course of the spine, and extending over the body. The chilliness may increase to shivering, with or followed by headache, pain in the back and limbs; full, irregular, and rapid pulse, thirst, and slight diminution of the milk and lochia. The bowels are usually costive and flatulent, the stomach disturbed, the tongue coated; the patient is depressed in spirits; complains of shifting pains in the abdomen, is anxious or afraid of dying; and, in the more smart attacks, she is slightly delirious at night. The face is flushed, and she has pain in the breasts and in the forehead, with throbbing of the temples, and slight soreness of the abdomen. To these symptoms a copious perspiration succeeds, and removes the fever and its attendant symptoms, the milk and lochia returning to their previous states. The attack is usually terminated in about twenty-four or thirty-six hours; and, if judiciously treated, it seldom returns; but, if it be neglected, it may assume an intermittent, a remittent, or a continued form; or it may be complicated with some visceral disease, and assume a dangerous aspect.

97. C. *Diagnosis*.—The suddenness of the attack, the irregularity of the pulse, the absence of local pain, excepting that of the head and of abdominal tenderness, the rapid succession of the different stages, and the cessation of the paroxysm in a few hours, distinguish this state of fever from true puerperal fever, from which, however, it will be distinguished with difficulty during the early stage, if all the phenomena of the latter be not duly considered. (See hereafter, § 251, *et seq.*)

98. D. *Treatment*.—During the cold stage,

warm diluents, warm flannels to the back, gentle restoratives, and external warmth, are required. The states of the several functions should be carefully examined; the uterine discharge, the mammae, and the abdominal secretions and excretions demanding the utmost attention. If the tongue be loaded, or if nausea be present, an ipecacuanha emetic should be given, and its operation promoted by warm diluents. If the bowels have been, and still are confined, a full dose of calomel or of calomel and jalap should be taken. In all cases the bowels ought to be freely evacuated by these or other purgatives, as the infusion of senna and salts, &c.; and, having hastened on the hot stage, saline diaphoretics, fewer bed-clothes, and diluents should be directed, in order to procure a free perspiration, which may be kept up for five or six hours. As the perspiration declines, or at the end of that period, the patient should have her clothes changed; and gentle restoratives, especially such as may promote the secretions and excretions, ought to be prescribed, with a view of preventing a return of the attack, and of restoring the tone of the system. From two to three grains of camphor, with as much henbane, taken twice or thrice daily, and such restoratives and diet as the state of the patient will suggest, will prove beneficial. If the patient be exhausted by the attack, wine-whey, or wine and water warm, with sugar, &c., may be allowed; or the tonic infusions, or the infusion of valerian, or the decoction or infusion of cinchona may be given, with the solution of the acetate of ammonia, the ammonia being a little in excess, and the spirit of nitric ether may be prescribed. The abdominal excretions ought to be freely promoted by a combination of the compound infusions of senna and gentian, and any neutral salt, with tincture of cardamoms; and rest procured by a soothing dose of camphor (1 to 3 grs.) with opium or henbane, or with morphia. Change of air, especially to the sea-side, is always beneficial. The diet should be light and nutritious as convalescence advances. The states of the mammae and uterus should receive strict attention, and if either organ present prominent disorder, the treatment should be directed accordingly.

99. ii. *INTESTINAL OR GASTRIC FEVER*—*FEBRIS GASTRICA VEL INTESTINALIS*.—*F. Gastrica vel Intestinalis Puerperalis*; *Puerperal gastro-intestinal Fever*.

CLASSIF.—*Ut supra*.

100. DEFIN.—*After chilliness or shivering, fever, with nausea or vomiting, flatulence, griping, diarrhoea, and various nervous symptoms.*

101. A. This state of fever is generally caused by previous torpor of and inattention to the bowels, by accumulations of bile in the biliary organs, and of morbid secretions and faecal matters in the bowels, especially during the advanced period of gestation; by errors of diet after delivery; by close, low, damp, and cold apartments or situations; and by the use of acid, cold, or unsuitable drink or beverages. It usually appears within ten or twelve days from delivery, and is liable to be confounded with ephemerical fever at its commencement; and, when attended by inflation of the bowels, with the puerperal fevers.

102. B. *Symptoms*.—After chilliness or rigours

the patient is oppressed at the stomach, loathes food, and becomes sick. The pulse is frequent and soft; she complains of being cold, although the skin, except that of the feet or legs, feels from the first hot to another person. Afterward she is thirsty, has a slimy or white tongue, sometimes with red edges, and vomits a ropy mucus or bile. She now feels hot, especially in the hands and feet, is distressed with flatulence and griping pains in the abdomen, and the bowels are at first either open or costive, the stools dark and very offensive, and subsequently relaxed or even purged. Purgative medicines always act abundantly, and afford relief. The pulse continues quick; the patient does not sleep, or merely slumbers; and then she talks, or is tormented by visions and dreams. She often complains of short, darting, or nervous pains, or of throbbing or confusion in the head. There is no fixed pain in the abdomen or hypogastrium, nor any tumour in the belly, which is generally soft. The local discharge is not necessarily obstructed, nor is the secretion of milk affected during several days; but, when diarrhœa is considerable, or continues, both one and the other are much diminished or suppressed. The countenance is unchanged at first, and continues so for some days, unless nervous symptoms, or pain in the hypogastrium, or some complication supervene. In some cases, when this disorder continues longer than six or seven days, and is neglected, inflation of the bowels, pain and tenderness in the lower part of the belly, pain on making water, or on passing the fæces, and other indications of irritation of the sexual organs supervene; while, in other cases, various nervous symptoms, as palpitation, vertigo, a feeling of sinking, or startings, and shooting pains in the head, are complained of. The duration of this fever, which is manifestly symptomatic of gastro-intestinal irritation, or consequent upon accumulation of morbid secretions in the biliary organs, and of fecal matters in the bowels, is usually from a few days to a fortnight.

103. *C. The Diagnosis.*—Intestinal fever may be distinguished from *ephemeral fever* by not appearing so soon after delivery; by its more gradual accession, and by the manifest disorder of the stomach and bowels attending it; by the character of the evacuations and the griping or shifting pains in the abdomen; by the ready and copious action of purgatives, and the more protracted duration of the disease. It may be mistaken for either *puerperal fevers*, but the symptoms just enumerated, the relief obtained from purgatives, the softness of the abdomen, and the absence of fixed pain, of tension and of inflation, unless occasionally in very protracted cases, the state of the pulse, and the general condition and appearance of the patient will distinguish this complaint from the more serious fevers of the puerperal state.

104. *D. Treatment.*—An emetic of ipecacuanha is always serviceable on the accession of, or early in this complaint. When its operation is over, saline diaphoretics and tepid diluents are then beneficial. A full dose of calomel may be given in a few hours after the emetic, and its operation on the bowels should be promoted by the administration of rhubarb and magnesia, or by a single dose of castor oil with spirit of turpentine. If the evacuations still

continue offensive, with griping pains, either of these purgatives should be repeated; but if they be more natural, or if diarrhœa supervene, then the existing irritation ought to be allayed by opiate or anodyne enemata. The bowels should never be allowed to become costive; either of the purgatives just named, or the infusion of gentian and senna, being interposed, or given according to the requirements of the case. If griping pains or flatulence, or inflation of the bowels become troublesome, the application of the warm terebinthinate embrocation over the abdomen, and an enema containing spirit of turpentine, with olive oil and asafoetida, will afford complete relief. The diet should depend upon the state of the bowels. If diarrhœa exist, light farinaceous articles of food, arrow-root, sago, and jelly may be given. If there be no diarrhœa, ripe fruit may be allowed; and, as convalescence proceeds, the several farinaceous articles, various preparations of rice, beef-tea, warm jellies, chicken-broth, &c., may be taken. Ginger-wine with water, Seltzer water with old Madeira or Amontillado sherry, the milder tonics, as the infusion of columba or of cheyreitta, may also be prescribed as recovery proceeds.

105. iii. MILIARY FEVER.—*FEBRIS MILIARIS*.—*FEBRIS MILIARIS PUERPERALIS*.—The eruption described under the head *miliary eruption* sometimes occurs during the puerperal state as a symptom of puerperal fevers. By several older writers, and by some as recently as the last century—by WHITE and others—it was described as one of the most formidable epidemics of child-bed; but it is now rarely met with, unless occasionally as a symptom of ephemeral fever, of milk fever, and of puerperal fever, when they are attended by profuse perspiration, and is evidently dependent upon a morbid state of the circulating fluids, consequent upon imperfect secretion and excretion, or upon the absorption of morbid matters, in connexion with excessive secretion from the skin. It occurs most frequently in delicate females, and commonly from the fourth to the twelfth day from delivery. This eruption affords no crisis to the disease of which it is symptomatic, nor relief to the symptoms. The treatment of this eruption, or, rather, of the disease of which it is a symptom, should be directed to the pathological conditions of that disease, as stated in the article "MILIARY ERUPTION."

IV. SEVERE PUERPERAL FEVERS.—*SYNON. Puerperal Fevers.*—*Febris Puerperalis*; *Febris Puerperarum*; *Metritis Puerperarum*, Sagar, Sauvages. *Hysteritis*, Vogel, Cullen. *Metritis Puerperalis*, Boivin, Dugès. *Peritonitis Puerperalis*, Forster, J. Clarke, Huill. *Fièvre Puerperale*, Fr. *Kindbetterinn-feber*, Germ. *The low fever of child-bed*, John Clarke. *Child-bed fevers*; *severe child-bed fevers*.

CLASSIF.—III. CLASS, II. ORDER (*Author in Preface*).

106. DEFIN.—i. NOSOLOG. *Great frequency of the pulse, and pain, tenderness, and tumefaction of the abdomen occurring in the puerperal state; the pain often commencing in the pelvic region with rigours, the patient generally lying on her back, with the knees more or less elevated.*

107. ii. PATHOLOG.—*Fever occurring in the puerperal state; commencing, in some cases, in local disease, with rigours or chills; in other cases, from*

infection of the frame and contamination of the fluids, with or without chills or rigours, and frequently with, but sometimes without, prominent local lesion of structure.

108. When treating of FEVERS in an early part of this work, I took occasion to point out the several and very different forms or types which the febrile diseases of the puerperal state assume (*see* FEVER, § 44); and Dr. FERGUSON, in his classical work on "Puerperal Fever," has adduced the arrangement I then suggested, with others adopted by the more recent writers on puerperal diseases. It is evident, from what this able writer has stated, as well as from the best works which have been published on the subject since the middle of the last century, but still more from an extensive experience of puerperal diseases in different circumstances, seasons, and periods of their prevalence, that *puerperal fever* is not either a simple or an unvarying malady, and that, thus influenced, it assumes the most diverse types, forms, and complications, and often the most malignant and fatal character of any disease met with in European, or even in other countries. It is hence the more difficult to comprise within the succinct limits of a *definition* those characters which are applicable to all the states which puerperal fever may assume, without omitting what is really important, and at the same time embracing only such features as are essential to its actual and individual existence.

109. I. LITERARY NOTICES OF PUERPERAL FEVERS.—Previously to 1689 and 1733, when HAKE and BERGER wrote on the "Fever of Puerperal Females," no satisfactory account of puerperal fevers existed, although inflammation of the womb after child-birth had been noticed by FELIX PLATER and TULPIUS; and the diseases incidental to this period had been viewed as consequences of errors in diet and regimen, and of interruptions or suppressions of the secretions and discharges, by SENNETUS, RIVERRIUS, WILLIS, DE LA BOE, MAURICEAU, STROTHER, BOERHAAVE, and others. The earliest accounts of puerperal fever as a distinct malady appeared in inaugural dissertations, published at some of the continental universities. These were probably of some importance at the times of their appearance, as containing much of the experience and views of the professors in these institutions respecting this malady, the earliest of these having been printed at Leyden in 1689. In 1746, puerperal fever prevailed in Paris, chiefly at the Hôtel Dieu, where scarcely any recovered from it, the albuminous exudations found in the peritoneal cavity appearing like to coagulated milk on the surface of the intestines, with a copious effusion of whey or milk-like serum; and hence the effusion was viewed as a metastasis of the milk, although a slight attention to the history of these cases would have shown that the secretion of milk was not suppressed, or even interrupted. (FONTAINE, COL DE VILLARS, &c., in *Hist. de l'Acad. Roy. des Sciences*, 1746, p. 16.)

110. POUTEAU (*Mélanges de Chirurg.*, p. 180) mentioned the appearance of this malady in the Hôtel Dieu of Lyons in the spring of 1750, and its great fatality. He noticed sero-puriform effusion into the peritoneal cavity, thickening and contraction of the omentum, a relaxed and softened state of the uterus, and gaseous distention

of the intestines as the chief appearances on dissection, and was the first who regarded the disease as an epidemic erysipelatous inflammation of the peritoneum. Dr. HALL wrote an account of this fever in 1755; and SAUVAGES viewed it as inflammation of the uterus, occurring, 1st. In the puerperal state; 2d. Associated with typhoid fever; and, 3d. With suppression of the milk. STÖRCK has stated that puerperal fever broke out in the hospital of St. Mark, at Vienna, in 1770, and prevailed through that city during the two following years. It was characterized by pain in the hypogastric region and abdominal swelling, the uterus presenting marks of inflammation and gangrene, and the intestines being covered by false membrane. Dr. DENMAN was the first author, after Dr. HALL in Edinburgh, who attempted in this country to give an account of this malady; but he appears not to have examined the body after death from this disease, although he more correctly infers that the milky matter described by the French pathologists as existing in the peritoneum is a product of inflammation. Dr. MANNING wrote soon after (in 1771), and ascribed the disease to a putrid tendency in the humours; and HULME, LEAKE, and WHITE, who followed him in quick succession, while they viewed the disease as inflammatory, and as affecting chiefly the pelvic viscera and peritoneum, believed that it could not be ascribed to simple inflammation, but to the inflammatory associated with a putrescent disposition; and MILLAR subsequently adopted the same view.

111. NEXT to POUTEAU, KIRKLAND espoused the most rational doctrine of the nature of this malady, on which he wrote in 1774, and considered it as arising from, and consisting of, sundry pathological changes; from absorption of putrid or morbid matter from the uterus; from inflammation of the womb; from the retention and absorption of morbid secretions and excretions. He concludes that, while absorption of morbid matter and inflammation originating in the uterus will occasion puerperal fever, the abdominal lesions will also be consequent upon the fever when occurring primarily. While KIRKLAND thus wrote so creditably, this malady appeared in the Hôtel Dieu of Paris, and prevailed during 1774 and 1775, but presented nothing of additional importance to what had already been ascertained. During the middle and towards the close of the eighteenth century, the disease was observed by numerous physicians, many of them of great reputation; but little was added to the existing knowledge of its nature and treatment, the fatality caused by it in hospitals being often so great as to harass the feelings of those who were called upon to combat it. More or less detailed accounts of the pathology and treatment of the malady appeared during this period in the writings of STOLL, BANG, BURSERIUS, BUTTER, HECKER, DE LA ROCHE, DOUBLET, FRANK, REIL, and others referred to in the *Bibliography*, but there is nothing furnished by them deserving especial notice.

112. In 1787 WALSH wrote on the disease, and considered it as an infectious fever complicated with diffuse inflammation of the peritoneum. In 1787 and 1788 this malady was prevalent in the General Lying-in Hospital in London, and an account of the appearances ob-

served upon dissection was given by Dr. JOHN CLARKE in 1788 and 1793. In that manifestation of the disease the peritoneum presented the chief morbid changes, and these he has described with greater precision than any of his predecessors. He remarked that the uterus and ovaria sometimes partook of the inflammation of the peritoneum, but not more frequently nor more remarkably than other parts, and that the interior surface of the uterus was not inflamed. From this time, and guided by Dr. JOHN CLARKE's description of the changes after death, puerperal fever was viewed merely as *inflammation of the peritoneum in the puerperal state*; and this view was adopted by Dr. GORDON, of Aberdeen, by Dr. JOSEPH CLARKE, of Dublin, by Dr. HALL, Mr. HEY, Dr. CAMPBELL, Dr. MACKINTOSH, and by Dr. ARMSTRONG, with but slight modifications, or with no farther modification than the expressing of the same idea in somewhat different words; for in medical writings different words are too often substituted for different ideas. These writers bring down the literature of puerperal fever in this country to 1822; their works deserving notice chiefly as furnishing examples of a particular form or epidemic state of the disease, without any recognition of other still more important states observed by other authors, and insisted on by HAMILTON, BURNS, BOER, DOUGLAS, and others referred to in the sequel.

113. In 1823 I became consulting physician to Queen Charlotte's Lying-in Hospital, notorious at that time, and indeed for some years before and after that time, for the recurring appearances of this malady in the most malignant forms in its wards; and for several years subsequently to 1823 I had numerous occasions of there observing the several states of puerperal disease. Contemporaneously with my own researches, and still more recently, investigations of a similar nature were made both on the Continent and in this country; and the results proved that inflammation of the peritoneum, in some form or state, although one of the most constant, is not the only, and often not the earliest change; and that alterations of the uterus, its sinuses, veins, and appendages, are equally common. POUTEAU had stated, about a century ago, that the inflammation of the peritoneum and pelvic viscera, in puerperal fever, is of an erysipelatous kind; and the same opinion was subsequently maintained by HUNTER, GORDON, and others, and still more recently by numerous writers. Indeed, the erysipelatous or diffusive character of the inflammation, when once the disease has commenced, could neither be overlooked nor disputed; for this character is, as I have shown when describing the causes of puerperal maladies (§ 35-43, 130, *et seq.*), a necessary consequence of the operation of these causes, which, by their effects upon the states of organic nervous power and of the blood, preclude the formation, by the inflamed surface, of organizable or coagulable lymph, by aid of which the extension of the disease may be arrested.

114. It has been shown by KIRKLAND, and still more demonstratively by BANG, of Copenhagen—a pathologist whose clinical and necroscopic researches have not received their merited attention—that not only the uterus, but also the ovaries and the Fallopian tubes

were inflamed, softened, or contained purulent collections; and that the womb often presented various changes in its internal surface. Similar lesions were afterward described by JOHN CLARKE, SELLE, and OSIANDER, and more recently by numerous authors in Germany, France, and Great Britain. Inflammation of the uterine sinuses and veins was first distinctly described by BANG and J. CLARKE, and subsequently by DANCE, LÜROTH, R. LEE, DUNPLAY, TONNELLÉ, CUSACK, INGLEY, the author, and others, and shown to exist, in many cases of puerperal fever, by several of these writers. Dr. JOHN CLARKE, however, in 1793, attempted to prove that the low, or the most malignant form of this malady, is distinct from that which is attended by inflammation of the peritoneum, and of the uterus and its appendages; and although doubts have been expressed of the truth of this doctrine, still my experience has shown its accuracy, and has convinced me that a most rapidly fatal and most malignant form of puerperal fever is occasionally developed in lying-in hospitals which is certainly not characterized by uterine phlebitis, nor by purulent collections in the uterus or its appendages, nor even in some cases by peritonitis, the chief lesions often being merely a remarkable alteration of the blood, general lacerability of the tissues or loss of their vital cohesion soon after death, with a dirty, muddy, offensive, and sometimes scanty serous effusion into the serous cavities. It is true that the circumstances by which this form of the disease is developed are seldom observed, and still more rarely at the present day than formerly; but when once developed in these hospitals, under the circumstances in which I have observed it, not a single patient, within a week or fortnight from her delivery, will escape this pestilence, which may even be propagated abroad to puerperal females, if the proper precautions be not taken. When I became consulting physician in 1823 to Queen Charlotte's Lying-in Hospital, the wards were small, crowded, and without ventilation, a large number of females being confined in each ward; and, as might have been anticipated, *a priori*, a most pestilential form of puerperal fever was always recurring a few months after it was reopened, after each occasion of its having been shut up for the purposes of fumigation and purification. In the fatal cases—and at first all the cases were fatal—the appearances now stated were those chiefly observed, in some instances with more marked disease of the peritoneum, and a relaxed or uncontracted state of the uterus. Subsequently, when the representations of the medical officers procured enlargement and better ventilation of the wards, with a diminution of the number of beds in a ward, puerperal fever was of rarer occurrence, and assumed different types and forms, with the progress of these sanitary alterations, inflammatory appearances in the uterus and appendages, in the uterine sinuses and veins, and in the peritoneum, being then most frequently observed in fatal cases. As I believe that in the present and advancing state of medical science and of sanitary improvement, the circumstances which have produced the more malignant forms of puerperal fever, the local pestilence, which I had to treat many years ago, are not likely to exist and to

occasion a similar intensity of the disease, so I infer that the various stages of inflammation of the uterus, of its appendages, of the uterine veins, and of the peritoneum will constitute the chief lesions of puerperal fever; and that the type or character of the fever will entirely depend upon the state of inflammatory diathesis; upon the states of vital power and of the blood, accompanying the inflammation; and upon the absence or the presence of contamination of the circulating fluids by retained or absorbed morbid matters and excretions.

115. ii. ARRANGEMENT OF THE FORMS AND STATES OF PUERPERAL FEVER.—Numerous writers have described only one or other of the several forms or states of this fever, very probably from having seen only such form during a limited experience, and in peculiar circumstances, or from having described what they saw on a single occasion, or in a particular epidemic. That this has actually been the case is shown by the fact that these authors have not described the same form or variety, but each has adduced the variety he has described as the true and only form of the disease, and has been indignant at those who believed that any other state of the malady can exist excepting that which he has observed. Thus ARMSTRONG, HEV, MACKINTOSH, CAMPBELL, &c., who observed chiefly inflammatory forms of the disease, accompanied with a sthenic diathesis, could not tolerate the idea that any other state of the malady existed, and were most ireful at J. CLARKE, HAMILTON and others, who believed that a low, typhoid, or malignant form, very different from that which they described, sometimes broke out. Thus, from the days of STOLL and DOULCET to almost the present time, some writers have described only a single variety, and have believed it only to be the true malady. But, as will appear more fully hereafter, the symptoms, characteristic features, and still more the *post-mortem* appearances, display diverse features and extensive complications, according to the circumstances occasioning the disease and influencing its course.

116. Several writers, on the other hand, with stronger powers of observation, or with more extensive experience, have viewed puerperal fever as more or less varied in form and complicated in its nature, and not from a single position or aspect merely, as those just alluded to, but according as diverse circumstances, seasons, or epidemic influences have impressed on it different forms and complications. Thus JOHN CLARKE, having observed, 1st. Inflammation of the uterus and ovaria; 2d. Inflammation of the peritoneum; 3d. Inflammation of the uterus, Fallopian tubes, or of the peritoneum, connected with inflammatory fever; and, 4th. Low fever, connected with affection of the abdomen, which is sometimes epidemic, recognized three types or forms of puerperal fever: 1st. That consisting of local inflammation in the puerperal state; 2d. Primary inflammatory or synchial fever developing local inflammation; and, 3d. Typhoid fever with inflammation. Professor VIGAROUS next divided the disease into, *a*. The gastro-bilious; *b*. The putro-bilious; *c*. The pituitous, proceeding chiefly from season, &c.; *d*. The inflammatory, or associated with inflammation of the uterus, peritoneum, &c.; *e*. and the sporadic, arising from

mental causes, cold, &c. M. GARDIEN arranged the forms of puerperal fever into the following: 1st. The angiostenic, or strictly inflammatory; 2d. The adeno-meningic, or slow insidious fever; 3d. Meningo-gastric, with bilious derangement, yellow skin, &c; 4th. The adynamic; 5th. The ataxic or nervous; and, 6th. Fever with local phlegmasia.

117. Several continental writers on puerperal diseases have confounded those which belong more essentially to the puerperal state with those which may occur under every contingency, which are quite unconnected with this state, and are not more likely to affect puerperal females than other persons; and they have thus embarrassed the subject with complicated sub-divisions and compound terms. Thus BUSCH enumerates the following varieties in the local affection, occurring in the puerperal state: (*a*) Puerperal fever with inflammation within the abdomen; (*b*) With inflammation within the cranium; (*c*) With inflammation within the thorax; (*d*) With inflammation of the extremities; and he believes that the character of the fever may also be varied as follows: 1st. Gastric fever; 2d. Nervous fever; 3d. Typhus fever; and, 4th. Petechial fever. RITGEN, like BUSCH, has rendered what is often a very complicated subject still more complicated and involved by his mode of discussing it. He views puerperal fever as a disturbance of the economy in its attempts to bring the organism back to the unimpregnated state; and he contends, that any organ in the three cavities of the body may become inflamed during this disturbance. He considers the term "*Malacoplachnitis puerperalis*" as the best that can be applied to the malady, since not only may the peritoneum be attacked, but any other viscus also, the chief peculiarity being the marked tendency of the local lesion to terminate in large fluid effusion.

118. Dr. ROBERT LEE, who has directed his attention to the state of the uterine vessels in puerperal fever, has referred the symptoms to four varieties: 1st. To inflammation of the peritoneal covering of the uterus, and of the peritoneal sac; 2d. To inflammation of the uterine appendages, viz., the ovaria, Fallopian tubes, and broad ligaments; 3d. To inflammation and softening of the proper or muscular tissue of the uterus; and, 4th. To inflammation and suppuration of the absorbents and veins of the uterus. It is manifest, however, that although cases will sometimes present one or other of these lesions, either singly or chiefly, much more frequently two or more of them will be associated in the same case; and therefore, instead of founding the varieties upon the individual lesions, it would be preferable to consider the local lesions as complications, or prominent changes occurring in the course of the malady.

119. The arrangement adopted by some other recent writers have been much more simple, and have possessed this recommendation, although it may have been carried too far. MARTENS acknowledges only the *inflammatory*, where one organ only is affected; the *nervous*, commencing with delirium; and the *putrid*, where the frame is more generally implicated. DOUGLAS has three forms, the *inflammatory*, the *gastro-bilious*, and the *epidemic*, or *contagious* or *ty-*

phoid. TONNELLÉ assigns only three varieties, the *inflammatory*, the *adynamic*, and the *atatic*. BLUNDELL adds also three, the *sporadic*, the *mild epidemic*, and the *malignant epidemic*. This last physician believes that in this last form, where the epidemical disposition to peritonitis is strong, the diffusion of the inflammation is great and rapid, whence the difficulty of the cure; that in the milder epidemic the peritonitic disposition is weaker, and the inflammation of smaller extent; and that in the sporadic the epidemic constitution is wanting altogether, and the local affection is limited, and the treatment much more successful.

120. Dr. GOUCH, Madame BOIVIN, and M. DUGÈS have reduced the varieties to two: the *simple inflammatory form*, or metro-peritonitis, and the *typhoid*. In this last form, M. DUGÈS includes all cases of softening of the uterus and of suppuration of the veins; but he is certainly not accurate in his description of the symptoms characterizing it.

121. The author, in 1834, adopted an arrangement of the *forms or states* of puerperal fever (see article FEVER, § 44), which he had observed in practice, and which will be followed and illustrated in the sequel. In that arrangement the local affection or affections were viewed as often being accidents or contingencies in the progress of the fever—as complications supervening in its course; while inflammations of the uterus and its appendages, and of the peritoneum, were admitted to be sometimes primary diseases, of which the fever was symptomatic. Dr. MOORE, in his very excellent treatise, published in 1836, very justly remarks, that the varieties observed in the local lesions in puerperal fever, arising under the same circumstances, cannot be viewed as forms or varieties of the disease, which may be known by the symptoms, but should be considered rather as complications appearing in its course.

122. Dr. FERGUSON, in his very able work on this malady, assigns as the result of his extensive experience *four forms*: 1st. Puerperal fever characterized by abdominal pain; 2d. Fever with gastro-enteric irritation; 3d. Nervous form of fever; and, 4th. Complicated form of puerperal fever.

123. Dr. CHURCHILL, the most recent writer on puerperal fever, divides it, according to the predominant local affection, into *five varieties*, which he has placed in the order of frequency of occurrence: 1st. Peritonitis; 2d. Hysteritis; 3d. Inflammation of the uterine appendages; 4th. Uterine phlebitis; 5th. Inflammation of the absorbents. This arrangement is open to the following objections: (a) It takes for granted that the lesions of these individual parts are truly and always inflammatory—are, in truth, inflammation seated in one or other of these structures, and the fever the symptomatic constitutional expression of the inflammation of such structure—positions which cannot be supported by enlightened observations. —(b) It leaves without any recognition or mention the type or nature of the fever as a consequence or effect of the exciting causes: it takes no account of the varying character of the constitutional disease, upon which, and upon it only, can rational and successful indications of cure be founded. —(c) It takes for granted that these lesions are primary, although this is only

occasionally the case; and fails of viewing them, as they are presented in practice, in various circumstances, and in different endemic and epidemic states of prevalence. It is based upon a partial or piece-meal consideration of the malady, and instead of being founded on a comprehensive and mature digest of constitutional and local changes, it assumes that the nature of the constitutional affection, as well as of the local lesion, is always the same, the only difference being the part originally affected; and it remarkably fails in this distinction, inasmuch as the local changes are rarely limited to a single organ or tissue, but are generally extended to several, and even to many. When most strictly limited, the appropriation of symptoms, so as to mark the limitation, cannot be effected with either truth or accuracy.

124. The above divisions of the several forms of puerperal fever comprise those which appear most deserving of notice. The classification of these forms, adopted from the results of my experience, and published in 1834, and subsequently by Dr. FERGUSON in 1839, embrace, 1st. The *inflammatory states* of puerperal fever, or *inflammation*, (a) of the uterus, (b) of the ovaria and tubes, (c) of the peritoneum, (d) of any two or all of them. 2d. *Synchoïd puerperal fever*, complicated with inflammation—a, of the peritoneum, β, of the uterine veins, γ, of the uterus and appendages. 3d. *Adynamic or malignant puerperal fever*—a, simple; b, complicated with predominant alteration; α, of the blood; β, of the fluids and peritoneum; γ, of the fluids, serous surfaces, and soft solids generally; δ, of the uterus, or of the uterus and appendages; ε, of the internal surface of the uterine vessels, substance of the uterus, &c.—(a) The *first form* comprises the *primary or idiopathic inflammations*, most liable to occur in the puerperal state, and which, commencing in either of the organs or structures here specified, are attended by symptomatic fever, characterized according to the diathesis, strength, and circumstances of the patient, and are limited, or more or less extended or associated, according to these and other influences and causes.—(b) The *second form* embraces those cases of frequent occurrence, especially in lying-in hospitals, in which it is difficult to determine whether the fever or the local affection is primary, or in which the local alterations rapidly follow the constitutional or febrile affection. In this form of the disease the symptoms are much more asthenically inflammatory than in the first, more insidious at the commencement, and often referable to a local contamination or infection. It may prevail in lying-in hospitals, on certain occasions which admit not of precise description, and may be propagated by contagion. It is not infrequently connected with the prevalence of erysipelas. I have seen it in the wards of hospitals which have not been over-crowded or apparently ill-ventilated.—(c) The *third form* is the most malignant, and in its most intense and pestilential states is seen chiefly in lying-in hospitals, or wards, when over-crowded and ill-ventilated. The whole frame appears infected from the commencement, and whatever local affections or lesions may exist are developed in the progress of the malady, such lesions merely presenting more prominent forms than those observed in other parts of the body. This

form of puerperal fever is caused by the local or endemic infection of the ward—by respiring an infected atmosphere; the infection originating as stated above. The disease produced by it may terminate rapidly in death, without any tissue or viscus having presented a more prominent lesion than the rest of the body. The blood, however, always is more or less altered, and the tissues generally are very deficient in vital cohesion immediately after death. When this form of the malady is less rapidly fatal, one or more of the complications, or rather of the more prominent alterations enumerated above, are generally observed.

125. Between the more primary inflammations, appearing sporadically, and constituting the *inflammatory form* of puerperal fever, and the *malignant form* now mentioned, that form which I have named the *synchoïd* holds an intermediate place, passing insensibly into either of the other forms with the intensity of the exciting causes and the amount of predisposition. This *synchoïd* or *intermediate form* may arise not only from a less concentration of the causes; from a less impure or contaminated air; from a less concentrated or intense effluvia; but also from an impure or infected state of the bed or bed-clothes, or from the infected hands of the accoucheur, causing a local infection during examination; or from other circumstances either already or about to be noticed; but according to the nature of the causes, their concentration, the state of the patient and the predisposition, so will it approach either the inflammatory form on the one hand or the malignant on the other; and so will it occur sporadically, or even extended by infection.

126. Another circumstance deserving a brief notice is the fact, which has been presented to me on several occasions, that, although the cases which occurred when ventilation was most deficient were generally of the third or most malignant form I have mentioned, yet occasionally a less malignant case, or one more properly belonging to the second form, presented itself, and was to be ascribed to the greater constitutional powers of the patient. But during this state of ventilation and infection not one escaped the disease who was confined in the hospital. Subsequently, when ventilation was improved, and when a fever ward was provided outside the institution, the cases presented generally the second form, and very few of the most malignant or third form were then seen.

127. Besides these three forms of puerperal fever, with their complications or more prominent lesions, another may be adduced, namely, infectious, or *true typhus fever* occurring in the puerperal state; and of which I have seen a few instances. The infection may have been received before or after delivery; but typhus fever appearing in this state should no more be viewed as a form of puerperal fever than small-pox, or any other of the exanthematous fevers ought to be so considered, when attacking a woman in child-bed. I shall, therefore, notice it no further than the diagnosis may require.

128. In the several works which have appeared upon puerperal fever, the *epidemic* and the *sporadic* occurrences of its several forms have been mentioned in a very loose manner. I have no doubt of any of the forms of the mal-

ady appearing sporadically, more especially the first and second forms which I have assigned, when circumstances combine to develop them; nor can I deny that any of these forms, more particularly the second and third, may become so prevalent, owing to a combination of causes, as to deserve the epithet epidemic. But most of the instances in which puerperal fever has become so prevalent as to be so called have occurred in lying-in wards; and the disease has been limited to them, unless on some occasions when the infection has been carried abroad from them. The term epidemic is, therefore, not strictly applicable, the malady being truly *endemic* as respects such institutions as thus occasion it, the character, the type, intensity, and other features of the malady depending much upon the *endemic sources*—upon the concentration of the infectious effluvia and other causes generated in these institutions and wards. It is not improbable, however, that certain atmospheric constitutions, depending upon the states of terrestrial and atmospheric electricity, and of humidity and temperature, and other circumstances affecting the prevalence of febrile maladies, may so affect also the form and prevalence of puerperal fever as to render it not only endemic in lying-in hospitals, but also epidemic, or approaching to this state, in various places in which it may break out. For, as I stated above (§ 36, 44, 138), causes similar to, or almost identical with, those which generate it in the lying-in wards, actually exist in various houses and localities, in such forms and degrees of concentration as to give rise to sporadic cases, which, when circumstances combine to favour their spread, may propagate the malady.

129. It will be asked, what are these causes which thus exist locally or endemically? 1st. Beds and blankets contaminated by prolonged use, without any attempts at purification (§ 41); 2d. Privies containing immense accumulations of fecal matters, often rising as high as the boards, emitting contaminating vapours, particularly when frequented or disturbed, and sometimes occasioning, as I have remarked in several instances, asthenic or irritative and spreading inflammation of the vulva, vagina, and cervix uteri of married females, and even also of the rectum. I am convinced that the domestic causes of disease, and even of the most malignant maladies, which I have described in the article PESTILENCES, PROTECTION FROM (§ 10-23), and of which I have even assigned proofs (§ 14) at that place, are mainly concerned in producing the more serious forms of puerperal disease, the malignancy of the attack depending chiefly upon the concentration or intensity of the cause.

130. iii. CAUSES.—The *causes of puerperal diseases* have been stated above, with reference both to the peculiar condition of the puerperal female, or the predisposition thereby acquired (§ 6, *et seq.*), and to the more efficient and immediate agents and influences (§ 35, *et seq.*, 129). These are disposing and exciting causes, which with their several concomitants, and especially when present in concentrated or intense forms, commonly occasion puerperal fevers—produce it sporadically and favour its spread. From the days of HIPPOCRATES down to the close of the last century, the suppression of the lochia

or of the milk was viewed as the chief cause of puerperal fevers; and certainly there can be no doubt that the suppression of these will often be followed by very serious disease, particularly of a febrile kind. But in most instances the suppression is merely one of the effects of antecedent causes; and it may not—indeed, most frequently it does not—take place in the most malignant states of the disease.

131. *A.* The *predisposing causes* of puerperal diseases have been already enumerated, and the influence of mental emotions has been noticed. The depression caused by *fear* of the disease, especially in lying-in charities, when the death of a patient is known, has a remarkable effect in favouring the extension of the disaster, and the *depressing feelings* entertained by unmarried puerperal females exert a similar influence. Large *losses of blood*, by uterine hemorrhage or otherwise, have a manifest influence, not only in predisposing to, but also in aggravating the danger of this disease, more especially in lying-in hospitals and wards. Several instances demonstrating the truth of this statement have been observed in the course of my experience. Hemorrhage appears to increase the predisposition, both by augmenting vital depression and shock, and by favouring the absorption of morbid secretions and excretions, and the passage of contaminating effluvia into the circulation.

132. Hydrometric and thermometric states of the *atmosphere* also favour the occurrence of puerperal fever, both by depressing nervous power and by concentrating animal exhalations. Cold and humid states of the air frequently prevent due ventilation of wards and apartments, and the requisite dilution of the contaminated atmosphere; and all methods of warming lying-in apartments which do not promote due ventilation, or currents of fresh air, tend remarkably to generate a pestilential effluvia in lying-in wards or hospitals. *Humidity* at all seasons, but more especially during winter and spring, favours the generation and propagation of this and its allied diseases, as remarked by writers of all ages, more especially of erysipelas, fever, dysentery, and rheumatism.

133. Some difference of opinion has existed respecting the seasons and states of the weather favouring the development of puerperal fever, especially in lying-in wards. My experience convinces me that *cold* is influential chiefly by preventing that amount of ventilation which is requisite when several women are in child-bed in the same apartment. According to my own observations, during a period of thirty years, the disease has been most prevalent during the last three months and the first four of the year. M. DUGÈS's observations, which are limited to 1819 and 1820 merely, show an order of frequency as follows: November, February, January, October, December, September, May, March, April, August, July, June. M. DE LA ROCHE, of Geneva, exhibits the following order of prevalence: January, March, November, December, April, October, September, February, July, August, May, June. As respects the influence of humidity there is greater uncertainty. But I believe that a moist state of the air, especially when conjoined with a low temperature, is most injurious, especially as respects lying-in wards; and in this opinion I

am supported by CHAUSSIER, DUGÈS, CLEIT, and others, while M. DE LA ROCHE considers that a dry state of the air is most favourable to the prevalence of the malady. Humid states of the atmosphere, conjoined with warmth and stillness, are certainly not infrequently productive of sporadic cases arising from the local sources of contamination and infection already pointed out (§ 36, *et seq.*); and from these cases either contagion or infection may extend, when the media are suitable to the transmission, especially by the midwife or nurse.

134. But neither temperature nor grades of humidity, nor both conjoined, always account for the prevalence or absence of this distemper. There seems to be a disposition to the prevalence of it at some periods and not at others, independently of the conditions now remarked upon. The states of the electricities, in as far as they affect the human body, may be the cause of this predisposition, or emanations from the soil, of a nature quite inecognizable to our senses and means of detection, may favour its development and diffusion. But the epidemic occurrence of the malady seems allied to the prevalence of low, or adynamic, or eruptive fevers, more especially of typhus and erysipelas; and when puerperal fever is found to prevail in lying-in hospitals, independently of crowding or want of due ventilation, it generally partakes of the nature of the prevailing epidemic, or of the general epidemic constitution.

135. Neglected states of the bowels, constipation, or diarrhœa; improper or insufficient food; addition to the use of spirituous liquors or cordials, and living in low, ill-drained, and ill-ventilated houses, also predispose to puerperal fevers. It is difficult to determine the influence of first or subsequent labours, or of the kind of labour. But very quick labours have been viewed as favouring the occurrence of puerperal disease in those confined for the first time; and prolonged or difficult labours in subsequent confinements. Premature labour seems to dispose to puerperal fever; but it may be mentioned that, when the patient is infected by the disease previously to delivery, or to the full period of gestation, premature labour will be thereby induced. Of this I saw two instances in consultation with medical friends in the winter of 1827 and 1828.

136. Other circumstances often concur with the foregoing in predisposing to puerperal fevers, more especially an age approaching to or above forty years; females who have suffered previous abortions, and who are vitally or mentally depressed or exhausted; severe, prolonged, or instrumental labours; those who have been subject to diarrhœa, hemorrhoids, or leucorrhœa; and those who are cachectic, or have been ill-fed, or kept *too low* during their confinement. Indeed, insufficient nourishment, or *inanition*, in the puerperal state, is a more frequent predisposing cause than usually believed. These require no remark, especially when they are concomitants of the foregoing causes, and with other states of predisposition noticed above. (*Sec* § 6, 10, *et seq.*)

137. *B.* The *exciting causes* are chiefly those which tend to contaminate the atmosphere of the lying-in apartment, or which may occasion a local infection.—(*a*) The *sources* of contamination have been described above (§ 35, *et seq.*,

128, 129); and although their nature and effects must have been long ago recognised, their removal and prevention have hitherto received very slight attention. But these are not the only sources. Many houses retain within their own walls sufficient causes of contamination and of local infection, as just stated, and as fully demonstrated under the head *PESTILENCES, protection from* (§ 10–23). These causes are often productive of dysentery and of asthenic inflammation of the vagina and uterus, and they may be inferred not to be less innocuous to females on the eve of delivery, the foul air evolved from these sources infecting the female organs, and thus producing sporadically either some one of the forms of puerperal fever, or uterine diseases incidental to the puerperal state. That these maladies have been thus produced in several instances I have had sufficient evidence to prove; and that the more febrile or severe may be propagated to other females in this state, when circumstances combine to favour the propagation, I firmly believe. Besides these sources of *extrinsic* contamination, and the effluvia disengaged from foul beds (see § 44), there are other influential causes which should not be overlooked, namely, direct and mediate contagion or infection, and the *intrinsic* contamination caused by morbid matters imbibed, and carried into the circulation from the uterus and vagina.

[The epidemic puerperal fever which proved so fatal among the lying-in patients of the New York Alms-house at Bellevue in 1840, could be distinctly traced to a vitiated state of the atmosphere, both general and local. For twelve or fifteen months preceding, there had been an unusual tendency to epidemic disease, generally of a typhoid character. An incurable diarrhœa, followed by mortification of either extremity of the alimentary, often with the loss of eyes, defied the efforts of medicine. Mortification often succeeded blood-letting. Ophthalmia, when treated in the usual antiphlogistic manner, was followed by rapid ulceration of the cornea. Scarlatina was very malignant and fatal. In short, there was a universal typhoid tendency in all diseases, requiring a tonic and supporting course of treatment.]

138. Not the least important of the exciting causes of sporadic cases, which, however, in circumstances favouring infection, may become more or less prevalent, is confinement in a low, close apartment, near where the exhalations from privies, cess-pools, or drains find an outlet and contaminate the air. Apartments near the ground floors of houses which are provided with privies and cess-pools that have no communication with drains and sewers—and most houses are thus most injuriously constructed—are liable to have the air in them contaminated at all seasons from these sources; but more especially in winter, when they are kept more closely shut, and when the exhalations arise not much less abundantly, and penetrate wherever hydrogenous exhalations may possibly pass.

139. The unguarded use of improper beverages, as beer, ale, wine, spirits, &c.; all sudden mental emotions, or shocks, frights, chagrin, anxieties, &c., and premature excesses of any kind, may concur to induce an attack of certain forms of the disease, especially of the more inflammatory. Coagula in the womb, or

retained in the vagina; portions of the placenta left adhering to the uterus, and death of the foetus in utero, may severally cause uterine phlebitis, or other forms of this disease, especially if the labour has been tedious, or has required the use of instruments.

140. (*b*) *The infectious nature of puerperal fever* has been denied by some, proved and believed in by many, and imperfectly elucidated, or stated without precision or due limitation by most recent writers on the disease. Infection, or even contagion, is undoubted—unless by the inexperienced and the skeptical—in certain circumstances and forms of the malady. MM. TONNELLE and DUCÊS, however, do not believe in the contagious nature of puerperal fever, and adduce their experience at the *Maternité* in Paris in support of their opinion. During the latter part of 1818 and spring of 1819, the disease was extremely prevalent in Paris, where I was then residing, and had an opportunity of seeing some of the cases which were so numerous in that institution, where alone about three hundred women died of it in these two years. It was prevalent at that time not only in lying-in wards, but also throughout Paris and its environs. These physicians state that it did not extend itself to the bed nearest that in which a patient was affected by it; and they assert that women newly delivered there had each a separate apartment, and yet were attacked. These are the chief facts in proof of their opinion, but they prove nothing beyond what has often been demonstrated (see § 143, *et seq.*), viz. that the malady is often propagated by the mediate contact of the hands of the midwife, and by the effluvia imbibed and conveyed by the clothes. They, however, admit, what was generally observed, both there and in other institutions, that when the fever was prevalent it generally attacked several in the same ward, and was sometimes confined entirely to one ward, a fact sufficiently demonstrative of at least an infectious or contaminated state of the air or of the bedding in that ward.*

[* DR. VACHE, of New York, has given a very interesting account of the prevalence of epidemic puerperal fever at the New York Alms-house in 1840. The disease made its appearance in the Alms-house on the 12th of June, 1840, and was quickly followed by two more cases, apparently so malignant that it was immediately determined to vacate the room, with a view to its purification. The inmates were accordingly removed, and the apartment was whitewashed, ventilated, and scrubbed; the bedsteads were cleansed, new beds and bedding introduced, and at the expiration of about a week it was considered sufficiently disinfected to return to it in safety. But the disease immediately reappeared, equally as violent and irremediable as before, and it was concluded most judiciously to abandon the building. Another was therefore prepared at some distance from the Alms-house, and appropriated as a nursery, after being put in the most perfect order; the bedsteads were cleansed and painted; new beds and bedding were furnished; the physician and nurse were changed; the pregnant women were directed to cleanse their persons by bathing; new clothes and shoes were given to them immediately previous to transferring them to their new habitation, and all intercourse arrested with the inmates of the surrounding premises. Notwithstanding these precautions, the first woman confined, and subsequently four others in succession, out of five labours, were attacked with the disease, and in every case it was fatal. The lying-in apartments at Bellevue were then abandoned, and others procured at Blackwell's Island. The same precautions were observed, and for a time the change of air, free ventilation, and a more generous diet seemed to have accomplished the object; several were delivered, convalesced, recovered, and were discharged without an untoward symptom; but the disease soon broke out with redoubled fury, attacking almost every woman confined, and setting at defiance every effort for their recovery. The disease in each locality was almost uniformly fatal. The treatment was diversified, consisting of a

141. A circumstance worth noticing is mentioned by M. DUGÈS, which is no mean proof of the influence of the infected air of the hospital upon the lower animals. During 1819 several cats, frequenting the wards of the *Maternité* during the prevalence of fever, were attacked by painful distention of the abdomen, and tumefaction of the parts of generation. The most of them died in four or five days; and the dissection of them was made, in the presence of Professor CHAUSSIER, by M. DUGÈS, who found in the peritoneal and pleural cavities a large quantity of a whitish serum mixed with albuminous flocculi, and a thin whitish coating covering the abdominal and thoracic viscera. A similar instance of the cat of the hospital becoming infected occurred in the hospital to which I was consulting physician during the prevalence of the fever in it.

142. In 1824, I was requested by a practitioner in the Edgeware Road to see a patient with him in this disease. She was the sixth case which he had had in the course of a few days. She was moribund when I saw her. I learned from him that each case of midwifery which he had attended from the first of these six cases was attacked in succession and had died; that he had called the most eminent accoucheurs to see these cases; that they had prescribed large bleedings; and that the present case had been also largely bled, as was then the general practice, the injurious effects of which were making themselves apparent. I insisted that contagion had caused these cases, advised measures to be taken against his being the medium of its transmission, and no other cases occurred to him for a considerable time.

143. Dr. CAMPBELL wrote on this disease in 1822, from a short experience; and, because he saw no reason to satisfy himself of the propagation of it by contagion, contended, in opposition to the no mean authority and more extensive experience of HAMILTON and GORDON, that the disease was neither infectious nor contagious, although he has adduced no conclusive evidence that some, at least, of the numerous cases which occurred in 1822 did not arise from contagion. It must be admitted that the sources of sporadic contamination which I have described above (§ 137, 138), are so abundant in Edinburgh, where Dr. CAMPBELL practiced, that the difficulty of discriminating between the influence of these and of contagion is thereby much increased. With a candour which always characterizes the truly scientific inquirer, this physician states that subsequent experience has shown him his error (*Lond. Med. Gaz.*, Dec., 1831), and, much to his credit, he adduces the following facts: After examining the body of a female who died of the disease after an abortion, and carrying some of the diseased parts to the class-room, he attended the delivery of a woman the same evening without having changed his clothes: she died. Next morning he went in the same clothes to assist a difficult case, the subject of which also died of the disease; and of others who were seized, within a few days, three shared the same fate. In June, 1823, he assisted at the dissection of

a case, where, from want of accommodation, he was unable to wash his hands with due care. He was soon after called to two patients requiring assistance, and went without farther ablution, and without changing his clothes, and both these were seized with the disease and died.

144. Dr. GORDON states, that the malady attacked only those women who were attended by a physician or nurse who had previously attended those affected with it. He remarks, that he had abundant proofs that any person who had been with a patient in puerperal fever became charged with an atmosphere of contagion which infected every pregnant or puerperal woman who came within its sphere. Dr. HAMILTON affirms that this fever is produced by an infection *sui generis*, and that he is quite positive that this infection is of so virulent a nature that it may be conveyed by a third person. Dr. GOOCH records that a surgeon, after opening the body of a woman who died of this disease, continued to wear the same clothes, and delivered a lady a few days afterward, who was attacked by a similar malady and died. Two more of his patients were seized in rapid succession, and also died. He then suspected the transmission of the infection by his clothes, changed them, and met with no more cases of the distemper. A washerwoman and nurse washed the linen of a female who had died of puerperal fever. The next lying-in patient she nursed died of this disease, and so did a third; when the circumstance having become known, she was no longer employed. At Sunderland, forty out of fifty of these cases occurred in the practice of one surgeon and his assistant. Many other proofs of infection have been adduced by Drs. LEE, MOORE, WALLER, ROBERTSON, and by many recent writers. The last-named writer, in a most instructive communication (*Lond. Med. Gaz.*, vol. ix., p. 503), states, that a midwife in extensive practice among the out-patients of a lying-in charity, within one month delivered thirty cases living in an extensive suburb of Manchester, and of this number sixteen were attacked with puerperal fever, and they all died; and that, of about three hundred and eighty delivered at this time by the midwives of this charity, none had the disease except the patients delivered by this midwife. Other conclusive facts are adduced of contagion by this writer.

[Numerous facts of a similar kind have fallen under our observation during a practice of twenty-two years, mostly in this city; but we conceive it unnecessary to go into detail to prove the contagious nature of this disease, as there are few, if any, American practitioners who do not fully believe in this doctrine. In three instances we have known the disease to follow up the accoucheur so closely that he has found it necessary to relinquish practice for a season, notwithstanding all the precautions he could use to avoid extending the disease through the medium of his clothes, &c. There is something truly remarkable in the extreme tenacity of this animal poison, and the minuteness of dose necessary to infect the lying-in female, as well as the certainty of infection upon exposure to the smallest particle of the infectious matter.]

145. These facts sufficiently show the contagious nature of this disease; that this fever may be propagated both by the hands, and by

general bleeding, cups, leeches, blisters, and fomentations to the abdomen, Dover's powder, camphor, turpentine, calomel, and opium, mercurial purgatives, Peruvian bark, stimulants, &c.]

the clothes, or by either, of a third person, that third person being generally the midwife or nurse. But not only is it thus contagious—the tangible communication often taking place during an examination *per vaginam*—but it is also infectious through the medium of the bedclothes or bedding, or the body-clothes of a patient, or of a midwife or nurse, or the contaminated air of a lying-in ward. I have had several occasions of observing that a lying-in hospital, or ward, for some time after having been opened or purified, will remain free from puerperal disease; but that, if too many patients be admitted, or if, owing to the season, weather, temperature, and humidity, the wards are too closely shut, the emanations from the discharges, &c., will soon contaminate the air, and infect the more recently-delivered women, the effluvia from those first attacked increasing the infectious state of the air, which is confined for a time to the wards where the emanations were first accumulated, but which soon becomes diffused through all the wards and apartments.

146. It has been very justly remarked by Dr. HOLMES, of Boston, United States, that, "suppose a few writers of authority can be found to profess a disbelief in contagion—and they are very few compared with those who think differently—is it quite clear that they formed their opinions on a view of all the facts; or is it apparent that they relied mostly on their own solitary experience?" Dr. DEWEES, in the last edition of his treatise on the diseases of females, has expressly said, "In this country, under no circumstance in which puerperal fever has hitherto appeared, does it afford the slightest ground for the belief that it is contagious." The evidence already furnished may be viewed as quite decisive of the infectious and contagious nature of the disease in Europe; but Dr. DEWEES is incorrect as to his statement of the matter as respects the United States; for, as Dr. HOLMES has remarked, Dr. FRANCIS states that the disease was, in some instances, supposed to be conveyed by the accoucheurs themselves; and Dr. PIERSON, of Salem, United States, admits this to have occurred to himself in several consecutive cases. Dr. CONDIE, although not previously a believer in the contagious nature of the malady, "has, nevertheless, become convinced by the facts that have fallen under his notice, that the puerperal fever now prevailing is capable of being conveyed by contagion." (*Trans. of Coll. of Phys. of Philadelphia*, July, 1842.) Dr. WARRINGTON stated at the same meeting of the college, that, after assisting at an autopsy of puerperal peritonitis, he was called upon to deliver three women in rapid succession. "All these women were attacked with different forms of what is commonly called puerperal fever." At this meeting, also, Dr. WEST stated that seven females delivered by Dr. JACKSON in rapid succession were all attacked with puerperal fever, and five of them died. These were the only cases which occurred in that district; for the women became alarmed at the existence of what Dr. DEWEES and a few with him have denied, and sent for other assistance. "And here I may mention that this very Dr. S. JACKSON is one of Dr. DEWEES's authorities against contagion!"

147. A physician in Boston, United States, had the following consecutive cases: on the

24th March, 9th, 10th, 11th, 27th, 28th April, and 8th May, seven in all, of which five died. He then left town. Another physician writes to Dr. HOLMES as follows: "The first case was in February (1830), during a very cold time. She was confined the 4th and died the 12th. Between the 10th and 28th of this month I attended six women in labour, all of whom did well except the last, as also two who were confined March 1st and 5th. Mrs. E., confined February 28th, sickened and died March 8th. The next day, the 9th, I inspected the body, and the night after attended a lady, Mrs. G., who sickened and died the 16th. The 10th I attended another, Mrs. B., who sickened, but recovered. March 16th, I went from Mrs. B.'s room to attend a Mrs. H., who sickened and died 21st. The 17th I inspected Mrs. G. On the 19th I went directly from Mrs. H.'s room to attend another lady, Mrs. G., who also sickened and died 22d. While Mrs. B. was sick on the 15th, I went directly from her room, a few rods, and attended another woman who was not sick. Up to the 20th of the month I wore the same clothes. I now refused to attend any labour; and did not till April 21st, when, having thoroughly cleansed myself, I resumed my practice, and had no more puerperal fever. The cases were not confined to a narrow space. The two nearest were half a mile from each other, and half that distance from my residence. The others were from two to three miles apart. There were no other cases in their immediate vicinity." (P. 517.) In another communication, the writer considered that he carried the contagion to five cases; and both he and the preceding correspondent state that the disease infected the young and the more aged—the strong and the weak; and without being influenced by the labour or other circumstance.

148. Dr. RAMSBOTHAM remarks, that he has known the disease to spread through a particular district, or to be confined to the practice of a particular person, almost every patient being attacked by it, while other practitioners had not a single case; and he views the distemper as being capable of conveyance in not only common modes, but through the dress of the attendants on the patient. (*Lond. Medical Gaz.*, 2d May, 1835.) Dr. BLUNDELL says, that some practitioners have lost ten, twelve, or a greater number of patients in scarcely broken succession; "that this fever may occur spontaneously, he admits; that its infectious nature may be plausibly disputed, he does not deny; but he would considerably add, that he had rather "that those he esteemed the most should be delivered, unaided, in a stable, by the manger-side, than that they should receive the best help in the fairest apartment, but exposed to the vapours of this pitiless disease. Gossiping friends, wet-nurses, monthly nurses, the practitioner himself, are the channels by which the infection is chiefly conveyed." (*Lect. on Midwifery*, p. 395.) My friend, Dr. KING, of Eltham, mentioned at a meeting of the Medical and Chirurgical Society (*Lancet*, 2d May, 1840), that some years since a surgeon at Woolwich lost sixteen patients from puerperal fever in the same year. He was compelled to give up practice for one or two years, his business being divided among the neighbouring practitioners. No case of the disease had occurred in the practice of these

practitioners, or occurred afterward. Mr. DAVIES states, that in the autumn of 1822 he met with twelve cases, while his medical friends in the neighbourhood did not meet with any, or at least with very few. He could attribute this to no other cause than his having been present at the examination of two cases, and his having conveyed the infection to his patients, notwithstanding every precaution. In December, 1830, a midwife who had attended two fatal cases of puerperal fever at the British Lying-in Hospital, examined a patient who had just been admitted to ascertain if labour had commenced. This patient remained two days; but labour not coming on, she returned home, when she was suddenly delivered before she could return to the hospital. On the third day she was seized with the fever, and died in thirty-six hours. A young surgeon, shortly after examining the body of a sporadic case that had died, delivered three women, who all died of puerperal fever. Mr. INGLEBY states, that two gentlemen, after the post-mortem examination of a case of this disease, went in the same dress, each respectively, to a case of midwifery. The one case was attacked in thirty hours afterward, the other in three days. One of the same surgeons attended, in the same clothes, another female, and she was attacked on the evening of the fifth day, and afterward died. These cases belonged to a series of seven, the first of which was believed to have originated in a case of erysipelas. Mr. INGLEBY also adduces another series of seven cases which occurred to a practitioner in 1836, the first of which was also attributed to his having opened erysipela-tous abscesses shortly before.

149. Dr. RIGBY remarks, that the discharges from a patient in puerperal fever are highly contagious; that the puerperal abscesses are also contagious, and may be communicated to healthy lying-in women by using the same sponge, as proved repeatedly in the Vienna Hospital; and that the women engaged in washing the bed-linen of the General Lying-in Hospital have been attacked with abscesses in the hands and diffuse inflammation of the cellular tissue. Dr. РАМСВОТНІМ, in a letter to me, mentions a series of seven cases, two of which he saw, which occurred successively to a surgeon in this city; and he, moreover, notices the connexion of erysipelas with certain of these cases; but to this I shall revert in the sequel. Now, after the evidence I have adduced—and I could have quadrupled the amount—is it not criminal for any medical man to go from a case of this disease, or even from a case of erysipelas, to a female in the parturient or puerperal state, without using the strictest precautions? I may conclude this part of my subject by stating that the fact of the contagious nature of this malady is completely set at rest by the above evidence, especially when it is undisputed that within the walls of lying-in hospitals a miasm is often generated as palpable to the senses, and even sometimes much more so, than the fumigations used to destroy it, so tenacious as often to withstand the common measures of purification, and, when generated, more deadly than the plague, if not arrested at its commencement by the most prompt and efficient means. I may farther add, that lying-in hospitals, or even lying-in wards, ought not to be

allowed to exist, for the reasons rendered apparent by what I have adduced, and because the aid they afford may be more beneficially furnished in other ways; and that boards of health, if such existed, or without them, the medical institutions of a country, should have the power of coercing, or of inflicting some kind of punishment on those who recklessly go from cases of puerperal fevers to parturient or puerperal females, without using due precaution; and who, having been shown the risk, criminally encounter it, and convey pestilence and death to the persons they are employed to aid in the most interesting and suffering period of female existence.

150. The contagious nature of puerperal fever has been denied by HULME, LEAKE, HULL, BEAUDELOQUE, TONNELLÉ, DUGES, DEWEES, and others; but GORDON, J. CLARKE, DENMAN, BURNS, HAMILTON, HAIGHTON, GOOCH, BLUNDELL, RAMSBOTHAM, LOCOCK, DOUGLAS, LEE, INGLEBY, ALISON, RIGBY, WATSON, CHANNING, and others have professed their belief in, or adduced proofs of, the existence of this property, as respects this, the most frightful of any of our domestic pestilences; and if any would prefer the weight of authority to the overwhelming evidence now adduced, the names I have enumerated must satisfy him—at least they are quite, nay, more than sufficient to warrant him in acting with caution, and to render him criminal in the eyes of the considerate part of the community if he should ever be the medium of transmitting contagion and death to those who confide not only in his science, but also in his humanity, and in the incalculable value attached by him to human life. Dr. HOLMES has forcibly and eloquently brought this much-neglected subject before the profession; and he thus concludes:—"It is as a lesson, rather than as a reproach, that I call up the memory of those irreparable errors and wrongs. No tongue can tell the heart-breaking calamity they have caused; they have closed the eyes just opened upon a new world of love and happiness; they have cast the helplessness of infancy into the stranger's arms, or bequeathed it with less cruelty the death of its dying parent. There is no tone deep enough for regret, and no voice loud enough for warning. The woman about to become a mother, or with her new-born infant upon her bosom, should be the object of trembling care and sympathy wherever she bears her tender burden or stretches her aching limbs. The very outcast of the streets has pity upon her sister in degradation when the seal of promised maternity is impressed upon her. The remorseless vengeance of the law is arrested in its fall at a word which reveals this transient claim for mercy. The solemn prayer of the Liturgy singles out her sorrows from the multiplied trials of life, to plead for her in the hour of peril. God forbid that any member of the profession to whom she trusts her life, doubly precious at that eventful period, should hazard it negligently, unadvisedly, or selfishly!"

151. *C. What connexion is there between puerperal fevers and erysipelas?*—The connexion apparently existing between these diseases has been hinted at above; but it is more remarkable at some seasons and occasions than at others. It was first observed and insisted upon by POUVEAU in 1750, who considered the puer-

peral fever as it then prevailed in Paris as an epidemic erysipelas of the peritoneum. Drs. HOME and YOUNG, of Edinburgh, and Dr. LOWDER, of London, not long afterward, also maintained this opinion. Dr. ABERCROMBIE, as Dr. MOORE has remarked, adopted a similar view, and founded his opinion principally on the circumstance of both diseases giving rise to serious effusion. In the various discussions this subject has given rise to, it has been contended by Dr. WHITING, Dr. WALLER, and others, that the identity of both these maladies is shown by the similarity of symptoms, and by the ill success of remedies; they asserting that, like erysipelas, puerperal fever cannot be arrested, and that it is contagious. This last property has been shown to exist, and cannot now reasonably be doubted. But that puerperal fever may be arrested I have proved on numerous occasions; and I shall have occasion to describe the means by which its arrest may be accomplished. Phlebitis of the capillary veins not infrequently complicates erysipelas, and uterine phlebitis is a frequent complication of the second or more intermediate grades or states of puerperal fever. These phenomena evince a certain amount of alliance, but not identity. GORDON, HEY, ARMSTRONG, and others contend for similarity, if not for identity. Dr. LEE states that in 1829, when the fever broke out in the British Lying-in Hospital, three children died of erysipelas, and on examination after death, the peritoneum in these infants was found extensively inflamed, and covered with a copious sero-purulent effusion. Three other cases are related as having occurred under similar circumstances; but it is admitted that cases of infantile erysipelas repeatedly occurred when there were no cases of puerperal fever in the hospital. I find it remarked, in my notes of cases of this disease observed by me in Queen Charlotte's Lying-in Hospital, that the relation subsisting between puerperal fevers, whether of an inflammatory, or of a malignant, or of an intermediate type, and erysipelas, especially of an epidemic form, has been evinced on several occasions, and during several periods, in which the former have prevailed. Instances of both diseases occurred in the winter and spring of 1823 and 1830, and of almost every intermediate year. But cases have also been observed of either malady without the other; and, while infantile erysipelas has occasionally been seen contemporaneously with the appearance of puerperal fevers among the women, the former has not infrequently been met with when the latter did not exist, either sporadically or endemically.

152. Dr. HOLMES notices, in his instructive memoir, that Dr. S. JACKSON went from a case of gangrenous erysipelas which he had been dressing to the first of the series of cases which took place in his practice; and that a Dr. C., who delivered seven women in succession, who were all seized with puerperal fever, had made, on the 19th of March, the autopsy of a man who died after a very short illness, from œdema of the leg and thigh followed by gangrene, and the first of these seven cases was delivered by him on the 20th, the following day. When making the autopsy on the 19th, Dr. C. wounded his hand, and was confined to his house, after delivering the first case on the

20th, until the 3d of April, and on April the 9th he attended the second case of fever. "Several cases of erysipelas occurred very soon afterward in the house where the autopsy of the man just mentioned took place. There were also many cases of erysipelas in town at the time of the puerperal cases. The nurse who laid out the body of the third puerperal patient was taken on the evening of the same day with sore throat and erysipelas, and died in ten days. The nurse who laid out the body of the fourth case of puerperal fever was seized on the day following with symptoms like those of that case, and died in a week, without any external marks of erysipelas."

153. Another physician, who had a series of five successive cases of puerperal fever, states, in a letter to Dr. HOLMES, that for two weeks previously to the first case of puerperal fever he had been attending a severe case of erysipelas, and the infection may have been conveyed through him to the patient, as he admits; but, he asks, "Wherefore does not this occur to other physicians, or to himself at other times; for he has since had a still more inveterate case of erysipelas, but he has had no disease in any of his midwifery cases?" It would be culpable in him to make the experiment, or to repeat the risk, without due precautions. Inoculation with the matter of smallpox or cowpox does not always communicate the disease; indeed, it often fails of doing so; but no one now disputes the contagious nature of the virus inoculated. Dr. MERRIMAN, an able and cautious practitioner, mentioned (*Lancet*, 2d May, 1840) that he was at the examination of a case of puerperal fever at 2 P.M. *He took care not to touch the body.* At 9 o'clock the same evening he attended a woman in labour; she was so nearly delivered that he had scarcely any thing to do. The next morning she had rigours, and died in forty-eight hours. Her infant had erysipelas, and died in two days. A patient whom I was attending in the hospital, in 1823, was seen by a lady; and, while listening to her faint voice, her breath was felt by the lady, who was stooping over her. This lady was the following day attacked with erysipelas in the face.

154. Dr. RIGBY states that, in one epidemic in the General Lying-in Hospital, the child of every woman who died of the disease perished of erysipelas, which ran its course in a few hours. Dr. RAMSBOTHAM remarks, respecting this topic, that the cases recorded by CEELEY and INGLEBY are so strongly in point, as to render it almost impossible to withhold the conviction that there is a form of fever to which puerperal women are liable, not only arising from the contagion of erysipelas, but, in its turn, also occasioning that disease in other persons. Whether in this affection, when it arises under such circumstances, the peritoneum is always attacked, is a question which he believes may be answered affirmatively in the great majority of cases. He further states, that on three occasions he has known the women who have nursed patients that died of this fever attacked with erysipelas of the leg; that in 1841, when erysipelas was prevalent in Rotherhithe, a medical friend of his had six cases, and while attending these he delivered a lady, who was speedily seized with puerperal fever,

and very soon afterward died. Her nurse was attacked with erysipelas of the hand, and was attended by another surgeon. One day, after having made an incision and dressed the wound, this latter surgeon was called to a case of midwifery: puerperal fever supervened, and the patient sunk very rapidly. A third fatal case, attended by the same practitioner, Dr. R. also saw, and others that did well. The disease disappeared in that vicinity when these practitioners declined to attend women in labour. Since the appearance of the second edition of his work, Dr. R. has met with additional facts, which he has had the kindness to communicate to me. A surgeon, in Clerkenwell, had five fatal cases of puerperal peritonitis, rapidly following each other, and two others, which Dr. R. saw, and both recovered; but both the children of these two latter cases died of erysipelas. One of the nurses in these last cases also took erysipelas. When this surgeon attended the first case of puerperal fever, he was just recovering of an attack of diffuse inflammation of the cellular tissue, with abscess of the fore-arm, consequent on having pricked his finger in opening the body of a woman who died of cancer of the uterus. Dr. R. concludes with believing, that "the connexion between malignant puerperal fever—that is, the fever in which the peritoneum is the seat of disease, and which terminates in the rapid effusion of soft lymph and whey-like serum into the cavity—and erysipelas is perfectly established." I may add to the above my opinion that the evidence is altogether satisfactory; that some of the series of cases of the more malignant states of puerperal fever have been produced by an infection originating in the effluvia proceeding from erysipelas, or by the contagion of the matter or contaminating material produced by erysipelas. It is quite unnecessary for me to adduce farther facts in support of this inference, but they may be found in the writings of CEELY, ACKERLEY, RIGBY, S JACKSON, HOLMES, INGELBY, PALEY, STORES, NUNNELEY, and numerous others, referred to in the *Bibliography* to this article. My opportunities of observing this disease since 1812, and what I have seen of it in hospitals and in private practice, have convinced me of the propriety of the following *inferences* and *precautions*.

155. *a.* That lying-in hospitals and wards have been established and supported on mistaken views as to the benefits they confer on individuals and the community; that the charity would be bestowed more safely to the objects themselves, and to others contingently, if it were so administered as to afford the required aid, to increase the comforts, and to improve the sanitary conditions of females in the puerperal states at their own places of residence.

156. *b.* If these institutions be still continued and supported, as introductions to midwifery practice, or for the doubtful benefit of the recipients of a certain kind of charity, the obstetric physicians and surgeons attached to them ought not to attend those cases of puerperal fever or of erysipelas which so frequently break out in the wards of such institutions; for, by doing so, they convey the poison from one patient to another, both within and without the institution. In all such circumstances, the consulting physician or surgeon to the institution, who, as

in my own case, should not be engaged in the practice of midwifery, ought to take charge of these cases, which should, immediately upon their attack, be removed, with due care and precaution, into a separate ward, provided for the reception of such cases, and situated without the walls of the hospital, but apart from other houses.

157. *c.* A physician or surgeon engaged in obstetric practice, upon the occurrence of puerperal fever in any of his cases, should either explain the matter to her friends, and call in a physician not engaged in this practice, to whose care she ought to be committed; or he should relinquish the care of puerperal females during his attendance on cases of this fever, and even of erysipelas; or he should change all his clothes, and carefully wash his hands, after seeing cases of either of these maladies, before proceeding to a puerperal female.

158. *d.* An obstetric practitioner should not make an autopsy of a case of puerperal fever, or of erysipelas, or of peritonitis, or of diffusive inflammation of the cellular tissue, or of the disease occasioned by the necroscopic poison (*see art. Poisons, § 487, et seq.*), nor even attend, or dress, or visit any of such cases, without immediately afterward observing the precautions just stated, and allowing two or three days to elapse between such attendance and midwifery engagements, or visits to puerperal females, [and even where these precautions have been strictly observed, we have known the disease to be communicated by the physician to his lying-in patients.]

159. *e.* It is the duty of obstetric practitioners attached to public institutions to prevent, as far as possible, the spread of this pestilence by midwives, nurses, or other assistants; and, as soon as two or three cases occur in succession, or other causes of suspicion present themselves, to take the most decided measures against the extension of contagion. Whatever indulgence may have heretofore been extended to those who have been the ignorant causes of the misery disclosed by the above statements—which convey but a small part of what has occurred in recent times—cannot now be expected, and ought not to be granted; for the practitioner is now too well informed, or, at least, the sources of information as to this matter are too open for him to be longer ignorant, that this most deadly of our domestic pestilences is conveyed from the infected to the healthy chiefly and most frequently by the accoucheur, when it occurs without the walls of a lying-in hospital, and that ignorance of, or inattention to, this fact, already not unknown to the well-informed part of the community—this flagrant neglect of what we owe to those who confide in us, and to society in general, to whom we must look for consideration and esteem—will be no longer viewed as a *misfortune*, but will be more justly considered a *crime* of no small magnitude.

160. *D.* *What connexion is there between puerperal fever and other maladies, especially such as are epidemic or endemic? and may atmospheric vicissitudes or conditions be viewed as concerned in this connexion, and in their prevalence severally or collectively?*—The *infectious nature* of puerperal fever has been demonstrated above (§ 140, *et seq.*), and it has been shown, as in Dr. MER-

RIMAN's case, that the disease may be communicated without contact, although there is also reason to believe that the contact of a *materia morbi* will also convey it. The connexion between this fever and *erysipelas*, also a contagious disease, has next been shown (§ 151, *et seq.*); and it has been proved that the effluvia from a case of puerperal fever will produce *erysipelas* in a person predisposed to this latter malady, while that evolved from a case of *erysipelas* will occasion puerperal fever in newly-delivered females. Moreover, it has been shown by several cases in the course of my practice (to two of which I was called by one practitioner in the winter of 1827–28), that the infection of either this fever or *erysipelas* may be transmitted to females who are pregnant, more especially at a far-advanced period of gestation, and may rapidly produce premature delivery, followed by all the characteristic phenomena of malignant puerperal fever; while, on the other hand, abortion or premature delivery, particularly when either is accompanied with great hemorrhage or flooding, predisposes remarkably to the infection of puerperal fever, as well as to that of *erysipelas*.

161. The prevalence of *typhoid* or *adynamic fevers* have been considered by some writers as more or less connected with the occurrence of puerperal fever, and, indeed, that this latter is merely typhoid fever modified or aggravated by the puerperal state. We find that *smallpox* and *scarlet fever*, or *measles*, are remarkably aggravated, and the danger from them greatly increased, when they attack a puerperal female. But these diseases always preserve their identity and their specific forms, and the power of perpetuating or extending themselves. Their characters are not lost in those of puerperal fever; and if, during their course, the phenomena or the internal lesions and complications usually observed in malignant puerperal fever appear also in them, they are merely superadded, and become the causes of the greater malignancy and more rapid progress of the malady to a fatal issue. Now this has been the case also with the *true* or *exanthematic typhus*, when it affects a puerperal female, as far as my observation enables me to judge; for the characteristic eruption and the low, muttering delirium—the typhomania—marking this fever have also appeared in the puerperal manifestation or complication of it, the features of the puerperal malady being also present; the puerperal state imparting to this specific fever, as it does to the exanthemata, dangerous complications, more malignant characters, and a much more rapid and unfavourable issue.

162. I have had reason, however, to believe that puerperal fever may arise sporadically from the same causes as that form of fever which I have denominated *putro-adynamic*—the *putrid fever* of the older writers (*see art. FEVER*, § 484)—that fever, varying in its subordinate features, and in the lesions supervening in its course, may be produced in the puerperal state by the same causes as those which occasion that form of continued fever; that animal exhalations, the foul vapours from putrid animal matter and burying-grounds, the effluvia from privies and sewers, and the infectious emanations yielded by those affected by this fever,

will produce puerperal fever, in all respects the same as when it prevails in lying-in hospitals; and that the puerperal fever thus originating may be spread in the manner above demonstrated; that, in short, malignant puerperal fever may arise sporadically from those sources of infection I have described when treating of this property (*see INFECTION*, § 11, *et seq.*) and of the causes of *putro-adynamic fever* (*see FEVER*, § 449, *et seq.*, 484), and be transmitted from one puerperal female to another, when the circumstances favouring this transmission are present.

163. Dr. COLLINS states, that puerperal fever has become epidemic in the Dublin Lying-in Hospital on several occasions when typhus fever prevailed in that city, and at other periods when *erysipelas* was frequent. A patient was admitted at a late hour labouring under fever with petechial spots over the body. She was removed to a separate apartment, and died soon afterward. The two females who occupied the beds adjoining hers were attacked with puerperal fever and died. A patient in fever was admitted at night into one of the labour wards, where she remained for some hours. This ward contained four beds. The three women occupying the other beds were attacked with puerperal fever, and two died. Dr. COLLINS adds, that the recovery of the patient attacked with typhus fever at the full period of pregnancy is an interesting fact, as he believes that no complication proves more generally fatal than the premature expulsion of the child under such circumstances.

164. The prevalence, also, of the low types of the exanthemata, of rheumatism, and even of other diseases, which are favoured more or less by humid, stagnant, and cold states of the atmosphere, may exist contemporaneously with that of puerperal fever; but in such circumstances the only connexion subsisting between them is to be ascribed to the atmospheric conditions, especially those just stated, probably also associated with certain electrical conditions of the earth's surface and of the air, and with emanations from the various sources of impurity and of infection with which all crowded localities, towns, cities, factories, &c., abound more or less, particularly when these emanations are not swept away by high winds and due ventilation.

165. iv. DESCRIPTION.—*Puerperal fevers* present certain *types* or *forms*, depending chiefly upon the following circumstances: 1st. Upon the intensity or concentration of the exciting causes, relatively to the predisposition of those exposed to their operation; 2d. Upon the degree of depression of organic nervous energy or powers of life produced by those causes; 3d. Upon the extent of contamination of the circulating fluids consequent either on the respiration of a foul or infected atmosphere, or on the absorption of morbid matters from the sexual organs, or from other parts; 4th. Upon the continued operations of these, or of various concurrent causes and influences, during the progress of the malady; 5th. Upon the states of season, weather, and epidemic constitution at the time cases of this malady occur; and, 6th. Upon the manner in which the infection is produced, and the media or channels by which it is conveyed, when the disease is propagated by infection or contagion, as shown above

(§ 140, *et seq.*). These circumstances, aided by constitutional peculiarities, the previous conditions of organs and functions, and the morbid tendencies of the patient, are also the chief causes of the complications, ultimate changes, and results observed in the advanced course and at the termination of the malady.

166. The various arrangements of the forms of puerperal fever adopted by medical writers have involved the following important questions, namely: (a) *Are the several forms or types of puerperal fever the consequences of local changes—of those lesions observed after death; or, in other words, are they merely symptomatic disturbances of the constitution produced by these lesions?*—(b) *Are the structural lesions or prominent changes found on dissection produced in the course of the malady, and are they the ultimate results of that malady?*—(c) *And are these forms or types different from their commencement, and the effects of different grades of intensity of the exciting causes, and of the different avenues or channels by which these causes invade and poison the frame?* Now the solution of these important questions has been eschewed by all writers, and even by the obstetrical writers on this malady, many of whom have mystified, rather than enlightened the subject. The answers which may be given to these questions will appear more illustratively in the sequel, for the importance of the topics to which they refer is great, not merely as respects an accurate description of the different resulting forms and states, but also as regards the adoption of appropriate prophylactic measures and rational indications of cure. The discussion of this topic cannot, therefore, be neglected with propriety. It is necessary first to advert to the modes and avenues by which the poison or infection may contaminate the frame, as above demonstrated (§ 143, *et seq.*). 1st. The atmosphere of a ward may be infected by animal effluvia—by exhalation from decomposed discharges, &c., as there shown; or a puerperal female may inspire the poisonous effluvia absorbed, retained, and afterward given out by the clothes of the medical attendant or nurse. In these cases the frame is infected through the respiratory avenue; organic nervous power and the circulating fluids being thereby morbidly impressed or affected. Whatever local changes or prominent lesions are observed after death, whether implicating the peritoneum, or the sexual organs, or other parts, are, in such cases, *consecutive* of the operation of the exciting cause upon the nervous and vascular systems, and upon the blood. In these there can be no doubt as to the local lesions being consecutive of the infection thus produced; although the mode in which the consecutive lesions or complications are developed may admit of discussion, as noticed hereafter (§ 245, *et seq.*).

167. 2d. It has been shown above (§ 137, *et seq.*) that the poison may be conveyed to the uterus or vagina by contact—by the hands of the accoucheur; or the poisonous miasms or vapours exhaled from foul privies frequented just before delivery—a gust of foul air on those occasions—may infect the vagina and os uteri; or the decomposition of coagula in the vagina or uterus, or of a portion of a retained placenta may so contaminate these parts, the inhibition and absorption of the decomposed matters,

or of ichorous or puriform secretions in these situations, affecting not only the state of vital power and resistance, but also changing the constitution of the circulating fluids in such a manner as to give rise to all the phenomena and complications of this malady. In this latter mode of infection—and through the channel or avenue now stated—the local changes in the sexual organs are, as respects their earlier grades, the first to be developed; although they subsequently increase in extent and intensity with the depression or exhaustion of vital power, and with the contamination of the circulating fluids; and progressively extend to the peritoneum, digestive organs, heart, and other remote parts, as hereafter described. In the first of these modes of infection (§ 166) the local alterations are generally *consecutive* of the constitutional affection; in the second they are *primary*, but of such a nature as rapidly to contaminate the whole frame, and as to become themselves quickly aggravated and extended by the consequent constitutional infection. The former of these modes is produced by an extrinsic cause or poisonous emanation generally conveyed through the medium of the respired air; the latter by the contact of a material poison either directly applied to the prominently diseased parts, or affecting them in the manner already stated (§ 129).

168. It may, however, be admitted that, when the frame of a puerperal female is infected by a foul air, generated either in a lying-in ward, or in an apartment by privies and sewers, &c., and when vital power is thereby depressed and the circulating fluids contaminated, the secretions or discharges from the uterus will then also become altered, more or less acrid or otherwise morbid, and thus infect the parts with which they are in contact. Nor will the local alteration, thus originating, be limited to these parts, but it will extend to adjoining parts and surfaces, and even to remote situations, as shown in the second of the above categories; the complications or local lesions thus supervening upon the constitutional infection, and in their turn augmenting that infection. Such being the two modes of procession of the morbid changes, it becomes the more important to recognise the phenomena by which each is distinguished; and to inquire, as I shall endeavour to do in the sequel—as I have many years since inquired and acted, and not unsuccessfully—respecting the means which may be rationally employed to arrest the onward tendency of these changes to disorganization, to dissolution of the vital cohesion of the tissues, and to death.

169. 3d. Besides the two classes of cases now specified, and arranged according to the manner in which their efficient causes invade the economy and develop the malady, there is a third; and to this class may be referred those cases which evince a more strictly local character, which are more individualized in their manifestations and more limited in their tendencies and structural changes. These generally are *primary*, or commence with local changes of an inflammatory character, the constitutional disturbance being symptomatic of such changes, and varying with the state of the patient, and with the influences to which she is subjected. In this class the local affection is

more decidedly inflammatory; and if the diathesis be not altogether *sthenic*, it is at least much less *asthenic* than in any of the former classes. The cases in this third class may occur independently of any infection taking place in either of the modes, or by either of the avenues, indicated above; or, if they be produced at all, as there stated, the causes are so weak, or operate in such a manner as not materially to reduce vital power or resistance, or remarkably to lower the tone of vascular reaction. Some of these cases may be referred to causes productive of irritation or of determinations of blood to the affected parts; or to the suppression of the secretions and excretions; or to the nature of the ingesta, or to various other causes of visceral inflammation. If in any case either of the modes of infection above specified be concerned in producing this form of the disease, the infectious agent fails in occasioning the same amount of vital depression, of structural changes, and of general contamination characterizing the other forms, owing either to the relative weakness of this cause, or to the constitutional power and strong vital resistance of the patient. Keeping, therefore, in view the different or varying forms of the malady—the progressively malignant states of puerperal fever, with the nature, intensity, or concentration of the existing causes, and with their continued operation, I proceed to consider, *first*, the more local and *sthenic*, or inflammatory form or type of the malady, and afterward the more *asthenic* and malignant.

170. *A. INFLAMMATORY PUERPERAL FEVER.*—This form of the disease has been viewed by many writers as an *idiopathic* or *primary inflammation*, occurring in the puerperal state—as a *puerperal peritonitis*, or as *puerperal hysteritis* or *metritis*, or as *puerperal oöaritis*, according as the *peritoneum*, or the *uterus*, or the *ovaria* and *ligaments* are the chief seats of inflammatory action and of local change. That this form of the disease may thus occur primarily, being developed by causes which tend to localize disease, owing to their nature and channels of operation, must be admitted. Cold, humidity, neglect of various comforts and requisites, improper food or beverages, mental emotions, &c., may primarily excite either of these local diseases, and symptomatic fever, varying in the character or type of vascular action, with the state of constitutional power, and with numerous other concurrent influences and circumstances. But in other cases, as shown above (§ 169), the primary character of the local disease is lost in the intensity or severity of the constitutional disturbance; and the more prominent lesion of one or more of the parts just particularized, either is an attendant of the vascular reaction following the operation of the exciting causes and the shock produced by parturition, or is consequent upon the reaction, and is favoured by those conditions and circumstances insisted upon above as being influential in determining and localizing puerperal maladies (§ 10, 11, 41). When the common causes of inflammation occasion disease of one or more of these parts, the constitutional disturbance is modified more or less by the puerperal state, and by the constitutional powers and other circumstances of the patient. But as the infectious and contaminating effluvia in poi-

son, so influential in causing the malignant forms of the malady, has little or no share in the production of the sporadic or inflammatory cases constituting this form, they generally present more or less of a *sthenic* diathesis, and pursue a more favourable and less rapid course than the others.

171. (*a*) *PUERPERAL PERITONITIS.*—*Peritonitis Puerperalis.*—*Inflammation of the peritoneum* may occur in the puerperal state sporadically from causes already noticed, or even without any very obvious exciting or external cause. It may either be primary, or the consequence of the extension of irritation or inflammatory action from some one of the organs or parts seated in the pelvic cavity to that portion of the peritoneum enveloping the part thus primarily affected. This latter mode is probably the most frequent; for the uterus, the tubes or ovaria, owing to injury, to excoriation, or to the irritation of the lochia, or to other causes, may be so affected as not to betray the nature or amount of the affection, in consequence of the peculiar condition of the patient, until the disease extends to the peritoneum, and thus the parts primarily disordered are either overlooked or unrecognised, and the more prominent and secondary alteration attracts the chief attention, and is considered the only seat of the malady. This form of the disease is most frequently caused by violence during delivery, by exposure to cold, or damp or wet linen or bed-clothes, or by the use of improper food or stimulants. It may not appear for a fortnight or three weeks after delivery; but when it is the primary lesion it may occur on the second or third day, or earlier than inflammation of the uterus. Uterine hemorrhage predisposes to it as well as to the other forms of puerperal fever.

172. *a* *The symptoms* of puerperal peritonitis vary with the constitution, habit of body, and other circumstances of the patient and the mode of attack. The pulse often continues to rise in frequency from the appearance of the reaction consequent on the shock of delivery, and pain is felt in different parts of the belly, which are soon followed by chills, rigours, or shiverings. With these great increase of pain in the abdomen, with tenderness and tension, sickness or vomiting, is complained of. The pain is occasionally universal, but it is sometimes limited to one part, and the belly soon becomes swollen and tense. The pulse is frequent, hard or sharp, and small. The skin is hot; the pain and tenderness increase, and extend over the belly. The patient lies on her back with the knees raised. The tongue is white and dry; sometimes clean, or loaded only towards the root. There are more or less thirst, occasional vomitings, and an irregular state of the bowels, which are generally at first costive, but afterward often relaxed or bilious. The lochia and milk are much diminished soon after the rigours, and are subsequently entirely suppressed.

173. These symptoms often appear rapidly and acutely, especially when the peritoneum is primarily attacked. But they sometimes come on less severely and more insidiously, especially when they are consequent upon irritation or inflammatory states of the uterus or its appendages. In these cases, the disease may at first be mistaken for after-pains; but the fre-

quency of the pulse, tenderness above the pubes, the shiverings, and the swelling and tension extending upward from the hypogastrium, indicate the nature of the disease. When the malady thus commences the symptoms are milder and more protracted at first; and the pain for some time is not severe until it rises above the hypogastrium, when it is rapidly aggravated and extended, and all the other symptoms increased. Whether the early symptoms are rapid or slow in their accession, or whether they are limited or extended, they soon augment; the belly becomes nearly as large as before delivery, and so tender as not to tolerate the weight of the bed-clothes; and the patient is deterred from turning, or lying even for a few moments upon either side, by the increase of pain thereby caused. With the extension of the inflammation over the peritoneum, the respiration becomes more strictly thoracic, and the movements of the abdomen less apparent; and when it reaches the diaphragm the breathing is difficult, anxious, short, and performed entirely by the intercostal muscles. Cough then sometimes occurs, which is short, suppressed, and painful. Painful eructations, or belchings of flatus, take place at intervals, attended sometimes by discharges of fluid from the stomach. The bowels, which were generally confined, become more relaxed, and dark, bilious, or variously coloured evacuations, or even purging supervene.

174. *β.* If a *favourable termination* is likely to occur, the abdominal swelling does not greatly increase. The pain either is arrested in its extension, or it gradually abates. The vomitings cease, the pulse becomes slower and fuller, the urine more abundant, and occasionally the lochia reappears, or is more copious. The breathing is easier and more abdominal, pressure is less painful, and the patient can turn more easily in bed. In rare and less favourable cases, the disease terminates in suppuration, and the abscess points and bursts externally at periods more or less distant from the attack, the matter in some such instances passing out at the umbilicus in about one or two months.

175. *γ.* If the disease proceeds *unfavourably*, the swelling and tension of the abdomen increase; the belly is round and prominent; the vomiting continues or becomes peculiar, consisting of a pumping or belching up of the contents with much flatus. The countenance becomes sharp, anxious, or pinched; the pulse still more rapid and irregular; and her slumbers short, unrefreshing, and sometimes attended by a wild or wandering delirium; but she often continues sensible to the last. The pain frequently ceases suddenly, although the abdominal swelling increases; the countenance sinks; the extremities become cold, and the tongue aphthous. A *fatal issue* usually takes place within five or six days; but the disease may be protracted much longer. According to the constitution and other circumstances of the patient, and the period that has elapsed from delivery, puerperal peritonitis may vary between the forms described as *sthenic* and *asthenic* peritonitis, when treating of *inflammations of the PERITONEUM* (see § 19–28), the symptoms and progress of the malady being altogether the same as there described. *The appearances on*

dissection are also the same as there stated, (§ 80, *et seq.*), or as exhibited hereafter (§ 221, *et seq.*).

176. (*b*) *PUERPERAL METRITIS.*—*Hysteritis Puerperalis.*—*Inflammatory puerperal fever often commences in the uterus*, the substance of the organ being affected about the third or fourth day after delivery, but often much later. It may arise from prolonged, difficult, or instrumental labour; from cold or damp; from stimulants or heating food; and from other predisposing and exciting causes already noticed.—

a. The *symptoms* vary much with the severity of the attack, and with the extension of the inflammatory action to the uterine peritoneum on the one hand, and to the ovaria and ligaments on the other. It thus assumes mild or severe forms, the progress of which is modified by the rapidity of the extension just mentioned. The *milder states of hysteritis* usually commence from the fourth to the ninth day, and much resemble the ephemeral fever. The patient is chilly or shivers, is sick, and sometimes vomits. The pulse is frequent and soft; and with the establishment of reaction, pains, which were occasionally felt in the hypogastrium, and which were, perhaps, only considered to be after-pains, become more constant, but are not severe. They are usually felt behind the pubis; but they may extend a little to either side, or towards the groin. Pain is also sometimes felt in the back, especially if the patient attempts to sit up. It may not be complained of even in the hypogastrium, when she lies still; but it is usually felt when turning to either side, or when pressure is made above the pelvis. There is no fullness, hardness, or tenderness of the abdomen. The lochial discharge gradually diminishes; but it does not necessarily stop; and the milk sometimes continues plentiful. The skin is hot; there are more or less thirst, no appetite, sickness at stomach, and disturbed sleep. The pulse varies from 90 to 110; the head is confused rather than painful; the urine is high-coloured; the bowels confined, and wandering pains are felt in the belly and sides. The bowels afterward become loose or irregular, the stools being dark, offensive, or morbid. Strangury, frequent calls to pass the urine, pains in the hips, and bearings down on micturition are often complained of. In the course of a few days, sometimes not until ten, twelve, or fourteen days have elapsed, the pulse becomes slower, the appetite returns, the painful symptoms referred to the uterine region subside, occasionally a slight discharge takes place from the womb, and the disease entirely disappears. Sometimes, however, the patient continues to experience more or less disorder referable to the uterus, with or without slight alterations of the position of the organ, until the menstrual discharge is fully established, when it subsides.

177. *b.* The more *severe form of hysteritis* is often caused by difficult parturition, by rude management, or by other more intense causes. It usually commences between the second and fifth day, but it may appear at a later period. It is ushered in by chills or rigours, which are often present, although the skin is hot, and which are generally preceded by pain in the lower part of the abdomen. With the appearance of reaction and of the febrile symptoms,

the pain becomes more constant and severe, but is usually characterized by exacerbations. The uterine region is very painful on pressure just above the pubis, and in this situation there is generally some swelling, which, however, does not extend farther until the peritoneum is affected. The abdominal parietes is slack or soft, so as to admit of the state of the fundus of the uterus being ascertained. The uterus is larger, harder, and much more sensible than usual. The pain extends to the back, shoots to the groins and hips, is attended by a sense of weight, and by difficulty of passing the urine. Occasionally there is distressing strangury, or complete suppression of urine. The lochial discharge is early suppressed, and the secretion of milk diminished or arrested. The temperature of the vagina is increased, and the sexual and urinary organs feel generally hot, inflamed, painful, and tender, the situation of the pain at the commencement varying with the part in which the inflammation originates. With the development of the local malady the symptomatic phenomena become prominent and severe. The pulse is very frequent, somewhat hard, or sharp; the skin is hot; thirst is increased; the tongue is white or dry; the urine high-coloured and scanty, or turbid; the bowels are at first confined, but afterward lax or irregular; headache is present; the countenance expresses suffering, but it is not collapsed or constricted as in peritonitis; and nausea and vomiting are urgent. Sometimes the internal surface or part of the womb is chiefly or only affected; and in this case a puriform discharge follows the diminution or suppression of the lochia.

178. *c.* If the inflammation do not extend over the peritoneum, a *favourable issue* is more likely to take place than in any other form of puerperal fever. This *termination* often is preceded by a copious perspiration, by diarrhœa, or by uterine hemorrhage, which is the most complete crisis. The abatement of pain and of the febrile symptoms; diminished frequency of the pulse; the reappearance of the lochia and of the milk; a free and general perspiration; a more natural state and excretion of urine; cessation of nausea and vomiting, and a more natural state of the bowels, are the surest signs of a favourable result.

179. *d.* An *unfavourable termination* of this form of the disease is to be feared when the inflammation extends either to the peritoneum or to the uterine appendages, or when it goes on to suppuration, either of the substance or sinuses of the organ.—*a.* If it extend to the *peritoneum*, the local symptoms, especially the pain and tenderness in the hypogastrium, advance upward, and gradually invade all the abdomen, or sometimes only the lower regions; and swelling, tension, and tenderness of the belly, with all the symptoms of *peritonitis* (§ 172, 173), supervene and *complicate* the metritis.—*β.* If this latter go on to *suppuration*, the pulse becomes still more frequent, fuller, softer, and afterward weaker, or more compressible, and smaller. The tongue is red or dry; the pain does not materially abate, but it becomes throbbing; chills or shiverings are sometimes experienced; and in the absence, or consecutive of these, copious sweats break out at intervals. The face is paler, or is more sharp than be-

fore, and occasionally a circumscribed hectic flush appears in the cheeks. The urine now deposits a pink sediment. The nights are sleepless, and, if the patient slumbers towards morning, she awakens in a profuse sweat. This suppurative form of hysteritis may prove early fatal; the pulse increasing in frequency, the tongue being red and raw, and the strength sinking; or the hectic symptoms may continue for weeks, and at last be fatal. Occasionally matter is discharged from the vagina, or by the bladder or rectum—often by the rectum. When it passes by the vagina the patient may recover; but when it passes by the other channels recovery more rarely occurs. It may break into the peritoneal cavity and produce fatal peritonitis.—*γ.* When metritis becomes associated with inflammation of the *ovaria, ligaments, and tubes*, the symptoms about to be mentioned supervene at an earlier or later period (§ 182).

180. *c.* The *appearances on dissection* depend upon the direction the disease takes towards the fatal issue. If it has terminated by fatal peritonitis, the usual alterations produced by that malady are found, sometimes with more or less softening of the uterus, or with sero-puriform infiltrations or purulent collections in the walls or in the sinuses of the organ, occasionally also in the veins and absorbents in the vicinity. If the disease has not extended to the peritoneum, but has terminated by suppuration, these latter changes are the more remarkable; and no farther disease of this membrane may exist beyond some alterations of the portion covering the uterus and appendages, consisting chiefly of exudation of lymph, with little or no serous effusion, but often with puriform infiltrations or collections underneath the peritoneum, and softening of the tissue. Gangrene or sphacelation is rarely observed, unless the autopsy has been delayed longer than twenty-four hours.

181. (*c*) **PUERPERAL INFLAMMATION OF THE UTERINE APPENDAGES.**—It is comparatively rare to find, either during life or on examination after death, the ovaria, broad ligaments, and tubes inflamed independently of peritonitis, or of peritonitis associated with hysteritis, in the more *inflammatory form* of puerperal fever. In the more *synchoïd* and *malignant states* of this fever, the uterine appendages are very frequently the seat of lesions hereafter to be described; but they are, perhaps, never found in these latter states affected alone; the peritoneum or the uterus, or both, and often several other structures, being also more or less altered. It is only in the inflammatory or more sthenic form of puerperal fever that these appendages are affected alone, or chiefly, and then only in rare instances. Even when the disease appears to originate in these, which is not unusual, it soon extends to the peritoneum; and, if it preserve its sthenic character, it does not spread much farther than to the portion of the membrane adjoining; but if the asthenic condition exist, or if vital power become depressed, or the blood contaminated by the absorption of matters from the uterus or vagina, the disease soon spreads from the uterine appendages over the peritoneum, if it be not arrested in its progress by treatment.

182. *a.* The *symptoms* of inflammation of the uterine appendages, whether the affection ori-

ginates in or extends to these parts, are generally ushered in with rigours, and with pains, tenderness, and fulness in one or both sides of the hypogastrium, extending to the groins, the pains generally shooting down the thighs. As vascular reaction is established, the pulse becomes rapid, the skin hot, the urine scanty, high-coloured, &c.; and headache, thirst, diminished or suppressed lochia, suppression of the milk, and other symptomatic phenomena appear. An examination *per vaginam* evinces increased heat and tenderness at the upper part of the canal, and in some cases even a tumour may be felt laterally. When the disease extends to the peritoneum, pain, tension, fulness, and exquisite tenderness advance upward; and all the symptoms of *peritonitis* supervene, sometimes with others more strictly appertaining to *hysteritis* (§ 176), with which the inflammation of the uterine appendages may be associated, as either the primary or consecutive affection.

183. *b.* The terminations of the inflammation of the uterine appendages are, 1st. In *resolution*, which may take place, as in cases of metritis, without any permanent injury being sustained. 2d. In *adhesions*, by the medium of coagulable lymph to adjoining parts, which, by their situation or extent, may be injurious at some future period. 3d. In *obliteration of the Fallopian tubes*, and the consequent loss of function, or sterility, which ensues. 4th. In *suppuration*, the matter forming either in the ovary, or in the broad ligament, or in the veins. The purulent collections or deposits may exist in these situations in various forms, the patient dying of the attendant softening and disorganization of the adjoining parts and of the purulent absorption, but most frequently of the consequent or associated peritonitis, and more rarely of the complication with metritis. A large collection of matter in these parts may burst into the peritoneal cavity, or may open into the vagina, or into the rectum, or through the abdominal parietes, near *POUPART'S* ligament. The appearances on *dissection* are described in the article *OVARIA*, and in the sequel (§ 229).

184. *B. SYNOCHOID PUERPERAL FEVER.*—*Consecutive Puerperal Fever.*—This form of the malady is that most frequently observed both in private practice and in lying-in wards, unless the causes be intense or concentrated, and then the disease assumes a more malignant character. This form may be sporadic, or endemic, or even epidemic, especially in lying-in hospitals; and in these, as well as elsewhere, it assumes modified states of vascular action and local affection, according to the constitution and other circumstances of the patient, to the relative intensity of the exciting cause, and to the avenues through which this cause affects the frame. Hence it presents, in different cases, every modification, from the inflammatory to the malignant. The same causes, or combinations of causes, as infectious miasms, transmitted by the medium of the surrounding air, or contagious fluids or secretions conveyed by the hands of the accoucheur, aided by concurrent influences, may, in the same ward, or in other places, produce this form of the malady in one female, and the malignant form in another; the state of the female, the period that has elapsed from delivery, the predisposition resulting from uterine hemorrhage, &c., remarkably favouring

the intensity and character of the attack. Thus I have seen in the same lying-in ward, and even in contiguous beds, cases not only of this form, but also of the most malignant form of the malady, each presenting different prominent affections: one peritoneal disease chiefly, another very remarkable uterine affection, a third prominent alteration of the uterine appendages and peritoneum, and in a fourth inflammation of the veins or lymphatics of the uterus and its appendages, or of both these vessels. This occurrence, and the circumstances connected with it, indicate two things, namely, the spread of the disease owing to the operation of a cause infectious or contaminating in its nature; and the production of different local alterations, in different cases, in connexion with the infection and contamination of the constitution; of the nervous and vascular systems, and consecutively of all the living structures.

185. *a.* The symptoms of this form of puerperal fever vary with the circumstances already noticed, and with the mode of its accession. In many cases the uterus is the first to be attacked; in some the uterine appendages are the first to manifest pain, tenderness, &c.; in others the peritoneum appears to be primarily seized; and in a large proportion alterations exist chiefly in the uterine veins, with more or less lesion of other parts. The mode of accession of the disease is no less varied than the local lesions discovered after death; and neither it, nor the progress of the symptoms subsequently, can always be strictly attached to the several states of the malady so as to indicate them truly during life. The accession of pain is often sudden, and as often insidious, appearing as after-pains, or as an aggravation of these, or merely as the increased sensibility of the uterine organs usually consequent upon parturition. It is frequently attended by chills or rigours, or by a recurrence of these; or the chills may be so slight as to escape observation. In the more robust, and when the powers of life are not remarkably depressed by the exciting cause, the shiverings are often severe; and in these reaction is usually more fully developed, and the disease more nearly approaches the inflammatory or sthenic form. As the chills disappear, the pulse, which was already frequent and small, becomes more frequent and fuller; but still soft, open, and compressible. The skin is hot; thirst, nausea, and vomiting are complained of, sometimes with cough, vertigo, or pain across the forehead. Soon after, or almost instantaneously with these symptoms, pains in the abdomen are experienced, in various degrees of severity; and the patient lies on her back, with the knees drawn up.

186. *b.* If the local disease commence in the uterus, the pain and tenderness on pressure are first felt in the region of the uterus, and the abdomen, above this region, is soft and flaccid. The body of the uterus is enlarged; and the pain, frequently at first recurring in paroxysms, or presenting exacerbations, is often mistaken for after-pains, until pressure indicates great tenderness, and discloses the nature of the attack. With the aggravation of the fever, the countenance becomes suffused and the respiration hurried. With the extension of disease from the uterine peritoneum to the rest of the membrane, the pain and tenderness extend up-

ward over the abdomen, which becomes swollen, tympanitic, acutely painful, and tender. Vomiting of dark coloured or greenish fluids ensue, often attended by diarrhoea, the stools being dark, offensive, and watery. The pulse soon becomes remarkably rapid and feeble, sometimes irregular; the tongue brown or dry, the teeth covered by dark sordes; the countenance sunk and pallid; the breathing short, laboured, and intercostal, with a short, suppressed cough, singultus, and eructations of flatus, with which more or less dark fluid is thrown up, without retchings. Coldness of the extremities, remarkable smallness and frequency of pulse, and a cold and clammy surface, with a short, gasping respiration, usher in dissolution, the mental faculties being often but little disturbed.

187. *c. If the local alterations commence in the uterine appendages* the symptoms generally are but little different from those just stated. Pain, tenderness, and fullness are first felt in either or both sides of the hypogastrium, instead of behind or immediately above the pubis, as when the disease begins in the uterus. The primary affection, however, may be seated in the uterus, without being detected, and extend to the appendages, or both to the uterine peritoneum and to the appendages, and thence, more or less, over the peritoneal cavity. In the early period of these cases, the abdomen may remain for a short time flaccid, and tolerant of pressure; but it soon presents all the symptoms just mentioned, with the severe constitutional infection, which rapidly increases and aggravates the local changes by sinking the powers of life and contaminating the circulation. When the peritoneum becomes implicated to a great extent, the symptoms above described are always present; and, if the disease be not arrested at an early stage, the fatal issue advances as there stated—the lesions observed after death being most remarkable in the uterine appendages, as will be shown in the sequel.

188. *d. That the prominent alterations so frequently seen in the peritoneum* actually originate in it cannot be doubted, in respect of some cases of this form of the disease; for the seat of the early symptoms and the appearances on dissection are not sufficiently demonstrative of a primary affection of the uterus or of its appendages. Nevertheless, it may be admitted that a local poison or a contagious fluid may affect the internal surface of the uterus, and that the change which takes place primarily in this part may be extended along the tubes to their fimbriated extremities, and thence over the peritoneum, the symptoms of the early lesions not being fully developed, or escaping observation, until the peritoneum is extensively implicated. When this membrane is thus primarily attacked, the pain generally commences at the epigastrium or about the umbilicus, is sudden and acute, and is attended by extreme intolerance of pressure, tympanitic distention of the abdomen, a rapid pulse, and vomiting; these symptoms being generally ushered in with chills or rigours, which may either precede or accompany the pain and tenderness of the belly. In some cases the chills or rigours are either slight or of very short duration, and may thus escape notice; but they are seldom ab-

sent altogether in this state of the disease. The pulse is always quick from the commencement, and even before either pain or rigours are experienced. The lochia and milk, in this as well as in the other states of this form of puerperal fever, are either diminished or suppressed from the appearance of the rigours. The urine is always high-coloured and very scanty, or even suppressed; the bowels irregular, the stools at first lumpy, afterward relaxed, watery, dark, and offensive; and the tongue white or parched, subsequently dark or brown. The countenance is anxious and collapsed, the respiration short, quick, gasping, and thoracic; and, during the advanced progress of the malady, the acute pain and tenderness of the abdomen subside with the supervention of fluid effusion into the peritoneal cavity; and the tension subsequently also subsides, the abdomen often being very tumid, but soft and swaggy. All or most of the symptoms accompanying an unfavourable termination of the other states of the disease now supervene with a rapidity varying with the severity of the attack and with the degree of vital power attending it, or of vital resistance opposing the occurrence of dissolution.

189. *e. Inflammations of the veins of the uterus and its appendages, sometimes of the lymphatics, and, in rare instances, of both orders of vessels,* are frequently the primary and essential alterations in the form of puerperal fever now under consideration; but they are not the only changes, especially in fatal cases; for, in these especially, various consecutive lesions, of an extensive and disorganizing kind, are also found on dissection, or even become very manifest before death. *Uterine phlebitis* is most commonly observed in the puerperal state; but it may occur, independently of this state, in consequence of ulceration of the os or cervix uteri, or of ulceration consequent upon the presence or removal of polypus. It is caused in child-bed by the usual circumstances and influences which occasion other inflammatory diseases in persons weakened or exhausted by prolonged suffering or by losses of blood, these conditions, especially flooding and difficult or instrumental labours, the depressing emotions, and a variolose state of the veins, favouring the occurrence of phlebitis. The chief or essential cause is undoubtedly the circumstance of the vessels of the uterus being placed, by the separation of the placenta, in an analogous state to the wounded surface of a limb after amputation. The irritation occasioned by an adherent portion of placenta, or by the decomposition of it, or of coagula which have not been thrown off, owing to the imperfect contractions of the uterus after delivery, is often a cause of this state of the disease. Injury, also, sustained during delivery, and alterations or decomposition of portions of the retained lochia, may either inflame the sinuses or veins, or may contaminate the blood in them, the portion thus contaminated farther changing the circulating fluid, and even affecting the vessels through which it passes. The disease of these vessels may, however, be produced by the contact of an infectious fluid, or by the changes occasioned in the lochia by the foul air to which this discharge may be exposed, as shown above (§ 137, *et seq.*).

190. *a. Uterine phlebitis* generally commences

in the vessels which have become in some respects exposed by the removal of the placenta, as shown by the frequent limitation of it to the vessels of that part or side of the uterus to which the placenta was attached. It often extends to the veins and sinuses of the greater part of the uterus, and to the veins also of the ovaria and tubes, but chiefly to those of one side, that side being the seat of attachment of the placenta, or principally its seat. Uterine phlebitis is often a simple or uncomplicated disease of the uterine organs, but it seldom continues any time without giving rise to various consecutive lesions, both of adjoining and of remote parts. When it is associated with inflammation of the internal surface of the uterus the phlebitis may be consequent upon this latter lesion; but when the substance of the uterus or the uterine appendages are also inflamed, it is difficult to determine which is primarily diseased. When thus complicated, the veins in some cases are most affected, and the substance of the uterus in others. In many instances, however, uterine phlebitis is associated with peritonitis, without the substance of the uterus being materially changed, or merely with slight softening; while in some there are not only phlebitis and peritonitis, but also extensive softening of the uterus and of the ovaria and ligaments. It is possible that the alterations of the sinuses, veins, and substance of the uterus may be nearly coeval; for if we admit the influence of injury, or of retained putrescent matters upon that portion of the uterus to which the placenta was attached, and upon the exposed openings of its vessels, the effects may be produced upon both the vessels and substance of the organ. But it cannot be disproved that inflammation may commence in either and be limited to it, or extended to the other, as circumstances may favour the extension.

191. Inflammation of the uterine veins generally extends to the veins of the tubes and ovaria; but those of the uterus may be inflamed on both sides, and yet the disease may extend only to the veins of one tube or ovary. M. DANCE states that the veins of the right tube and ovary are more frequently altered than those of the left. However extensively the veins of the uterus and appendages may be inflamed, the disease may be limited to these organs; but as frequently it is extended to their trunks, even as far as the hypogastric vein, or nearly to the vena cava. It may be asked, however, what are the changes which may be viewed as consequences of uterine phlebitis? and, should the presence of pus, merely in the uterine veins, be viewed as indicative of inflammation of them? The existence only of pus in the veins of the uterus is not sufficient proof that the pus is a product of inflammation of these veins, for the pus may have been imbibed by the veins from the cavity or internal surface of the uterus, where it had been produced by inflammation of that surface; and therefore, unless its existence be associated with changes in the coats of these veins, it cannot be viewed as a satisfactory proof of uterine phlebitis.

192. *β. The symptoms* of this form of puerperal fever—of uterine phlebitis—cannot be stated with the desired precision. Indeed, the accomplishment of the attempt is nearly impossi-

ble; for the change is so frequently and so early associated in puerperal females with alterations of the substance of the uterus and appendages, and not only with these, but also with changes in the peritoneum and in remote parts, that it is most difficult to separate the phenomena which belong to the phlebitis from those which are attached to the other lesions. The symptoms, therefore, of this form of the disease should be viewed as not strictly those of uterine phlebitis, but of that state of puerperal fever in which this particular lesion constitutes a more or less important part of the organic changes found after death. That this lesion is an important one in puerperal fevers is shown by the fact that pus and other changes in the veins have been found by M. TONNELLE in ninety-three cases out of two hundred and twenty-two, and in twenty-four cases out of forty-five by Dr. R. LEE. But in most of those cases in which it has been seen it was associated with other changes, as just stated.

193. Uterine phlebitis usually commences in from twenty-four to forty-eight hours from delivery, with pain in the uterus accompanying, preceding, or following rigours. The uterine region is tender on pressure, and upon the cessation of the shiverings and chills the lochia and milk are generally found much diminished, and if not altogether suppressed, they soon are. The pulse is frequent from the first, and general uneasiness, with physical depression, nausea, or vomitings, and headache are experienced. As the rigours cease, the skin becomes hot, the pulse more accelerated, but soft, often full, broad, and open, and the vomiting more frequent, a greenish fluid being usually thrown up. With the headache some degree of incoherence may be remarked in some cases, or delirium and agitation in others, which often pass into extreme exhaustion or a state of drowsiness or partial insensibility. Tremours of the muscles of the face and extremities, dysuria, or scanty or entirely suppressed urine, an irregular state of the bowels, or diarrhoea and offensive stools; extreme thirst, parched mouth, dry and brown tongue; a sallow, lurid, and dirty hue, occasionally with miliar or petechial eruption, and more rarely a dirty yellowish appearance of the whole surface of the body, generally supervene as the disease advances.

194. The pain in the hypogastrium varies in severity, but it may not increase with the progress of the malady, but the tenderness in this region is generally aggravated, and the abdomen is commonly swollen or tympanitic. If the phlebitis be associated with peritonitis, extreme pain and tenderness of the abdomen, great tension and tympanitic distention of the abdomen are experienced with all the symptoms attending the peritoneal state of the malady (§ 172, 173).

195. If the uterine phlebitis proceeds without being associated with inflammation of the pelvic or abdominal peritoneum, little or no pain in the hypogastrium may be complained of; or merely a dull pain, with a sense of weight. But this region will generally be found tender, or painful on pressure. The uterus, too, may return to its reduced volume, or nearly so if its substance be not implicated; but, if its substance be diseased, it commonly remains above

the brim of the pelvis, and is large, hard, and very painful on pressure. In many instances these local symptoms may be so slight as to escape attention, the constitutional symptoms caused by the passage of morbid matters into the blood, especially prostration of strength, feeble and rapid pulse, vomitings, and diarrhoea, low wandering delirium, brown parched tongue, diminished, suppressed, or puriform or offensive lochia, &c., at last exciting alarm, and indicating the existence of a most dangerous malady. A large proportion of cases terminate fatally in this more acute stage, or within eight or ten days; but a larger number live longer, some *secondary affection* supervening.

196. *γ. The consecutive affections* generally appear in remote organs, especially the lungs, pleura, brain, liver, spleen, the joints or muscles, the cellular tissue, the eyes, and digestive canal. One or other of these organs and parts, in the course of a few days, experiences a rapidly-disorganizing form of congestion or asthenic inflammatory action; softening, puriform, or sanious infiltrations, purulent deposits, and even gangrenous softening or liquefaction of the tissues, and effusions into serous cavities quickly following the secondary local affection, which is undoubtedly occasioned by the passage of the sanious and purulent matters into the circulation, and by the action of the contaminated blood on the capillaries of predisposed or susceptible parts. Many of these secondary affections advance insidiously, and without being attended with much pain or local distress until they reach the last stage of disorganization; while others betray much earlier, and by more evident symptoms, the nature of the consecutive mischief. Their progress, generally to a fatal issue, is often rapid; but not infrequently it is much slower, the duration of the malady depending on the seat and extent of the consecutive disorganization.

197. In this form of puerperal fever the inflammation may be limited to the veins of the uterus, but more frequently the muscular tissue adjoining the veins participates in it, and becomes of a dark-red or brown colour, and remarkably soft consistence; the peritoneal covering of the uterus may also be implicated, and the changes hereafter described be found in the appendages and peritoneum. The veins which return the blood from the uterus and appendages may be either wholly or in part inflamed; commonly, however, the spermatic are chiefly affected, and generally the one on that side of the uterus to which the placenta was attached; and it may be confined to a small portion of the vessel, or extend throughout it. Injection, infiltration, or condensation of the cellular tissue in which the veins are imbedded; thickening induration and constriction of the coats of these vessels; and the exudation of lymph, mixed with pus and coagula of blood within their canals, are the changes chiefly observed in fatal cases of uterine phlebitis. The hypogastric veins are more rarely affected than the spermatic. Dr. R. LEE ascribes this to the latter vessels being invariably connected with the placenta; but as in respect of the spermatic, so it is observed as regards the hypogastric, that only one is affected. Marks of disease of the uterine veins may extend by the iliac or the spermatic veins to the vena cava itself. "This

occurrence seldom takes place to a great extent through the medium of the spermatic; the inflammation usually terminates abruptly at the opening of the spermatic into it on the right side, or of the renal on the left. If it pursue, as it sometimes does, the direction of the kidneys, the substance of these organs, as well as their veins, may be involved in the disease."

198. *C. MALIGNANT PUERPERAL FEVER.—PUTRO-ADYNAMIC PUERPERAL FEVER.*—This most fatal form of the malady—most fatal if not very early, very decidedly, and most appropriately treated—occurs chiefly in lying-in wards, and in circumstances described above (§ 36–40, 140). It was the almost only form of the distemper observed in Queen Charlotte's Lying-in Hospital in 1823 and 1824, and until the improvements were made in the house. It is the most certainly infectious and contagious form of puerperal fever, being often conveyed by the clothes of the accoucheur or nurse. When this disease is produced sporadically by the foul or contaminating air of a close or crowded lying-in ward, or of a low apartment, liable to gushes of foul air from privies, sewers, or cess-pools, it is not infrequently conveyed to other puerperal females, as already shown (§ 137, 138); and it produces a similar, or but slightly-modified state of disease to that which transmitted the infection. In all its essential characters—as respects its exciting causes, the general depression of vital power, the rapid contamination of the circulating fluids and loss of the vital cohesion of the soft solids, &c., this disease very closely resembles *Putro-adynamic fever* (described at § 472, *et seq.*, of art. FEVER). The chief differences between them arise from the peculiar circumstances of the female at the time of infection; and to these are entirely to be imputed the rapid progress of the puerperal disease, the greater malignancy, if not early arrested by judicious means, and the local complications which frequently either appear during the course of the malady or are detected on examination after death.

199. *a. The symptoms* of malignant or putro-adynamic puerperal fever vary in the mode of their *accession* with the period of the puerperal state at which the infection appears to be produced. In three sporadic cases, to which I was called in consultation, the disease commenced in the last week or fortnight of pregnancy; and in two instances it either followed or caused abortion, for I was unable to determine the sequence; but as I traced, as I conceived, the disease in two out of the three sporadic cases just mentioned to the frequenting of privies having no communication with drains, and containing the accumulated exuviae of many years, it is not improbable that the abortion was the result of a local infection. When, therefore, the infection, poison, or contamination, however, or by whatever channel it may be communicated, attacks a female before delivery, or immediately afterward, or not until several days have elapsed from delivery, the *accession* of the early symptoms may be expected to vary accordingly.

200. (*a*) In a case of a female attacked *before delivery*, to which I was called by Mr. BARNWELL, the symptoms were the same as those observed by me in other cases. This patient was seized early on the 12th of February with acute pain throughout the abdomen, with enormous disten-

tion and exquisite tenderness; with very rapid, full, and soft pulse, varying from 130 to 136, and with frequent vomiting. I saw her in the afternoon of the same day. The vomiting and state of the pulse were as now stated. She complained of headache and of thirst, and was very despondent. Her tongue was broad, flabby, slimy, and tremulous; her countenance pale, anxious, and covered by perspiration, and her general surface moist, warm, and clammy. Labour-pains came on that evening, but were soon inefficient, the action of the uterus having ceased. Mr. BARNWELL administered *secale cornutum*, which ultimately induced uterine action, and she was delivered after a labour of about twenty hours. On the following day (the 16th) the distention and tenderness of the abdomen were diminished; and the sickness and vomitings, with borborygmi and flatulent eructations, continued. A pathetic depression of spirits, anxious expression of countenance, flabby and slimy state of tongue, a very rapid, fluent, and weak pulse, clammy state of skin, scanty and almost suppressed urine, quick and oppressed breathing, a feeling of pressure on the diaphragm, requiring the head and shoulders to be elevated, were soon followed by the symptoms ushering in dissolution.

201. (b) When the disease follows *almost immediately upon delivery*, or soon after this event, the earliest indication of the impending mischief is the great rapidity, softness, and weakness of the pulse, often attended by pain and tenderness at the epigastrium, by sickness and vomiting, followed by general distention of, and pains darting through the abdomen; but in the majority of cases there are neither chills nor rigours; in a few, a feeling of coldness only; and in still fewer, slight rigours. In this state of the disease the patient soon becomes despondent, predicts her dissolution, is afterward apathetic, and makes little or no inquiry for her infant. The milk and lochia are either little or not at all diminished, or are more than usually abundant. The abdominal pain and distention are sudden or quick in their accession, but the pain often soon ceases, the distention remaining, and afterward changing its character, if the disease continues above two or three days. The tongue, from the commencement, is flabby, broad, and slimy, or covered by a mucous or creamy coating, the pulse is usually from 120 to 140, or even upward, fluent, soft, or broad; and the general surface presents a lurid, or dusky or dirty hue, and is covered by a clammy and offensive perspiration. The countenance is pale and inexpressive, unless when the pain is acute, when it becomes anxious and covered by perspiration. The mind is but little disturbed beyond a state of complete apathy. As the disease proceeds, respiration is short, suspirious, or difficult; the pulse small and soft, or irregular; the bowels frequently relaxed, and the stools offensive and passed without control. Distressing feelings of sinking, leipothymia, or restlessness supervene, and are soon followed by the symptoms of impending dissolution.

202. (c) When the disease does not appear until *two, three, or more days have elapsed from delivery*, the abdominal pain, distention, vomiting, vital depression, and rapidity of pulse are very often sudden in their accession, and unattended by either chills or rigours; much more

rarely they are more gradual, and attended by chilliness or slight rigours. But physical and mental depression, absence of hope of recovery, of all affection or care for the infant, and of regard for any object whatever, and perfect indifference, characterize this form of the malady at whatever period of the puerperal state it makes its appearance. In one case, which occurred in the hospital in 1824, the attack took place above a fortnight after the patient was delivered, and while I was in the board-room. When I was visiting some other patients about an hour before her attack, she was sitting in a chair by the fire-place making no complaint; and after this short period I found her complaining of agonizing pain over the whole abdomen, with enormous tympanitic distention, extreme tenderness, and a pulse so rapid as hardly to be counted. Vomiting with eructations of flatus, leipothymia, cold, clammy, offensive perspirations, quick, short, and laborious respiration; failure of the pulse at the wrist; cold, clammy extremities; moist, flabby, and tremulous tongue; singultus, eructations or belchings of the contents of the stomach, and loss of power of the sphincters successively supervened, and terminated in death within twenty hours from the accession of the seizure.*

* The following case, recorded at the time, will illustrate this form of the malady. I adduce it, not as being characterized by extreme malignancy, nor by any marked peculiarity, but as a specimen of the disease as it was then prevalent, and as the treatment which had been adopted was such as could not have influenced the rapid tendency of the disease to dissolution. Mrs. TURNER, married, aged about twenty, was delivered on the 2d of February, after a natural labour. She was seized on the 11th, without any chill or rigour, with severe pain in the epigastrium, distention and tenderness of the abdomen, rapid, soft, and weak pulse, sickness, and vomiting. The matters thrown off consisted chiefly of greenish fluids, and the pain extended to the hypogastrium and both groins. I was not called to her until the evening of the 13th, about fifty-four hours after the accession of the disease. She then presented the following symptoms: The pulse was so rapid and weak as hardly to be counted or felt at the wrist; the hands and feet were cold and clammy; the breathing remarkably quick, difficult, and laboured; the countenance sunk, and of a pale, livid hue; the conjunctiva pearly, and the pupil contracted; the abdomen was tumid, but not tense nor very painful; the milk was abundant, and the lochia scanty, but not much more so than usual at that period after delivery. The tongue was clean, broad, and slimy; the skin was covered with a clammy, offensive perspiration, and the heat of the trunk was below the natural standard. The urine had been scanty, but passed without difficulty; the bowels duly evacuated. The odour exhaled from the body was peculiar and very marked. Her mind was collected, but indifferent to everything. She died a few hours afterward—about sixty hours after the first feeling of disease.

Inspection twenty-four hours after death, present Drs. COLLAND and DENNISON, and Mr. CHOLMONDELEY. The thoracic viscera presented no farther disease than congestion of the posterior parts of the lungs, and loss of vital cohesion. The peritoneum was very slightly adherent in parts by means of a film of puriform lymph which covered the membrane throughout the whole surface. This film was thickest on the right side, and over the diaphragm, stomach, liver, and spleen. These viscera, as well as the kidneys, were healthy, excepting that they were more friable and softer than usual, especially the spleen. The omentum was remarkably softened, and was drawn together like a cord in the middle of the abdomen between the convolutions of the intestines. There was not much fluid effused, but it had a livid and whey-like appearance, especially between the convolutions of the bowels, and between the right ovary and cæcum. The peritoneum, when the film of puriform lymph was wiped off, was congested, with dark blood in points or streaks, and much softened, so that it could be torn in parts like to wetted paper. The uterus was of the usual size, for the period which had elapsed from delivery; and its structure, when divided, appeared natural. The internal surface of the uterus seemed, also, sound in consistence and colour. The veins of the organ were quite healthy. The spermatic and hypogastric veins on both sides were natural, and contained little blood. The right ovary was of a

203. (d) Whatever may be the period or mode of its accession, this variety of the disease always pursues a rapid course; and, unless early arrested by energetic means, it almost always tends to general contamination of the fluids and structures, and to death. At its commencement the nervous system of organic life and the blood appear to be suddenly and seriously affected, as shown by the general loss of vascular tone and of sthenic action; by the disturbance of all the vital functions, and relaxation of contractile parts. The earliest symptom is often the remarkable rapidity of the *pulse*, which is also broad, open, soft, or fluent, or small, thready, or irregular, but always very quick and compressible. *Rigours* and chills are generally absent; or if they have been present, they are either slight or of short duration. In the most rapidly fatal cases, or such as occur in crowded or close lying-in wards, they rarely occur; and in these the disease may be *uncomplicated*, or present no prominent lesion or affection, the whole frame participating in the malady, through the medium of the organic nervous and vascular systems; or, if any prominent lesion appear, the peritoneum and other shut cavities most frequently experience it, and present the appearances hereafter to be noticed.

204. a. These more *simple states* of this form of the malady may run their fatal course in from twenty hours to two or three days, the earliest symptoms being remarkable frequency and softness of pulse; pain in the epigastrium or extending over the abdomen, with tympanitic or flatulent distention, and tenderness; frequent vomitings, and sometimes purging; a scanty or suppressed state of the urine; a lurid or dusky appearance of the surface, which is covered by a clammy perspiration, and exhales a peculiar and disagreeable odour; a pallid, apathetic, and sometimes slightly livid or sallow countenance, the eyes being sunk, or surrounded by a dark circle; a broad, flabby, tremulous tongue, which is covered by a slimy or cream-like mucus; little or no thirst; an abundant secretion of milk, and a copious discharge of the lochia, which often becomes offensive or otherwise changed, and great apathy and disregard of the infant and of all relatives. These symptoms may exist in the most marked degree; the respiration becoming short, suspirious, and gasping, the vomitings being more frequent, and attended by belchings of flatus, or passing into a pumping up, or eructations of the contents of the stomach, and alternating with singultus or

with leipothymia, and the abdomen still continuing remarkably distended by flatus, until, after a period varying in duration, as just stated, dissolution takes place, preceded either by extreme restlessness, difficulty of breathing, and lividity of countenance, or by sudden or gradual sinking of all the vital functions, and a feeling of impending death. In these cases the mind may evince no farther disturbance than the state of indifference just mentioned, or a low wandering delirium at times, the patient answering correctly when roused, and expressing a conviction of dying, and indifference as to the issue.

205. β. When this most malignant form of the disease is *complicated*, or accompanied with any of the prominent lesions to which frequent allusion has been made, the symptoms are somewhat modified either early or in the course of the malady. The most frequent complication is that with effusion into and other lesions of the *peritoneum*. When this surface is prominently affected, the pain and tympanitic distention and tenderness of the abdomen are most severe, and is either general, or is felt most severely near the epigastrium, or in one or both sides of the hypogastrium, indicating in this latter case the origin of the mischief in the tubes or ligaments. In rare and most severe cases, especially if the malady has followed floodings, dissolution may take place before the peritoneum experiences farther change than is presented by other parts; but more generally, or if the case continues two or three days, the abdominal pain subsides more or less, and with it the tympanitic distention and tenderness partially diminish. The abdomen now furnishes indications of more or less effusion into the peritoneal cavity, which generally increases, and which, by its acidity, increases the loss of cohesion which this membrane evinces after death. In other respects the symptoms of this state of the disease pursue the same course as that just described (§ 204), varying only slightly with the severity of attack, and the extent of contamination or change of the circulating fluids and the degree of vital resistance opposed to these and other alterations.

206. γ. There can be no doubt of the *uterus* and its *appendages* undergoing, in some cases and on some occasions in which this form of the malady appears, more or less prominent changes; but it is very difficult to determine the period of the disease in which they occur, or the exact procession of the morbid phenomena. Although the peritoneum may present the chief lesions, as shown above in some cases, it is seldom that the uterus, and its appendages especially, are much disorganized without this membrane being also implicated very extensively or throughout. It is very probable that disease may have extended from the internal surface of the uterus and Fallopian tubes to the fimbriated extremities, and thence over the peritoneum, at least in some cases; and that the uterus may have been so early softened and otherwise affected as to implicate the peritoneum, the change thus induced in this membrane rapidly extending, owing to the infected and contaminated state of the frame. It may not unreasonably be assumed that the general infection produced by the exciting cause will render the lochia more acrid or septic than in

brownish colour, and slightly enlarged. When divided, a little colourless fluid escaped from the interstices of its structure. The right Fallopian tube appeared slightly inflamed, especially at its fimbriated extremity. No purulent or other matter was found in the sinuses or veins of the uterus. The site of the placenta was somewhat darker than usual at the surface, and covered with a dark, semifluid lymph; but the vessels proceeding from the part were empty, and of natural appearance. The veins of the heart were much engorged with black blood. The left ventricle was empty and flaccid, the right was filled with black blood. The body was but little rigid, and the external surface slightly discoloured, of a yellowish livid hue. The whole intestinal canal was greatly distended by gas. This and other cases which I have examined have suggested the belief that in some instances at least the disease extends from the internal surface of the uterus along the Fallopian tubes to their fimbriated extremities, and thence to the peritoneum. I have frequently observed that the structural changes, both in the ovary and peritoneum, have been greater in the same side as that in which the fimbriated extremities of the tubes were most altered.

more favourable circumstances, and that this state of the discharge, especially when retained in the sexual passages, may contaminate these parts, and give rise to the changes observed, in some cases not only in them, but also in the peritoneum and adjoining cellular tissue. I have usually observed that in these instances the milk has been undiminished, and the lochia more or less offensive, usually abundant, sometimes remarkably putrid or fetid. In this complication of the malignant state of the disease, pain, tenderness, and fulness have commenced either in the hypogastrium, or in one or both sides of this region, and extended to the sacrum and loins, shooting irregularly through the abdomen, which has also presented considerable flatulent distention, with borborygni. The pain has also often extended to the groins and tops of the thighs. In all other respects the symptoms are the same as are observed in the simple and peritoneal states of the malady; but their progress to a fatal issue, although not the less certain, when they are not judiciously interfered with, is generally less rapid, and is often accompanied, as in the former states of the malignant form, with frequent recurrences of faintness or sinking, with dysuria or suppression of urine.

207. *d.* In the most malignant states of puerperal fever, the *veins* and *lymphatics* rarely present inflammatory changes. It is chiefly in the synchochoid form, or when the disease displays a less degree of malignancy and pursues a less rapid course (§ 189, *et seq.*), that purulent matter and other changes are found in these vessels. It does not, however, follow that morbid matters are not imbibed by either the veins or lymphatics, or even by both, and carried into the circulation because they do not evince any lesion of their parietes; on the contrary, it is not improbable that sanious or putrid matters may be imbibed by the veins in this form of the malady, and contaminate the blood, without producing sthenically inflammatory lesions, or any very evident changes, in these vessels; the irritation produced by such matters on their internal surface giving rise, in the existing state of the frame, to an ichorous exudation, which is carried into the blood and mixes with it, and not to that form of lymph which coagulates and arrests the progress of the mischief, nor even to a puriform matter, such as often is met with in the synchochoid or less malignant forms of the malady, not only in the veins, but also sometimes in the lymphatics.

208. The *lymphatics* of the uterus and its appendages, and their vicinity, present changes in a few cases which have been viewed as, and which probably are, inflammatory. These changes, however, consist chiefly of the presence of pus in the lymphatics, and of congestion of the glands in the vicinity, and are found chiefly connected with inflammatory changes, or with the presence of pus in the veins, or with purulent deposits, or with ulcerations in the pelvic viscera and parietes. The *symptoms* of changes in the lymphatics of the pelvis are hardly to be recognised during life, owing to their associations with the alterations of other parts just mentioned. I have observed these changes chiefly in cases which have commenced with asthenic inflammatory symptoms referable to the uterus and other pelvic viscera, and even also

to the pelvic parietes, which have been of several days' duration, from eight or nine to fourteen or more, and which have terminated in one or other of the consecutive lesions already noticed (§ 196). I have, however, remarked that these cases generally are attended by acute pain in one or both sides of the hypogastrium, extending to the groins, with tenderness, and sometimes with enlargement of the deeper-seated glands in the groins; but the former of these symptoms also accompany prominent affection of the ovaria and ligaments.*

209. *D. Of certain Symptoms marking the Form and Terminations of the Disease.*—*Rigours* and *chills* have been stated by most writers as ushering in the disease. This is the case certainly in the more inflammatory states, whether of a sthenic or asthenic diathesis, but they seldom occur in the most malignant forms. When they do occur, then generally are the *milk* and *lochia* diminished or suppressed, if, indeed, the secretion of milk has commenced before the accession of the malady. But in some cases rigours are experienced without the suppression either of the secretion or of the discharge; but this is rather the exception than the rule. In the malignant states of the malady, even when effusion into the peritoneal cavity is very great, neither is the milk, nor is the lochia suppressed or even diminished, but, on the contrary, they are more than usually abundant, while the latter is often very offensive and contaminating. In the more strictly inflammatory, and in the synchochoid or intermediate forms of puerperal fever, suppression or diminution of the milk and lochia generally obtains—suppression in the more inflammatory, and diminution in the synchochoid. In the malignant states of the disease observed by me in 1823, 1824, and 1825, the lochia was rarely remarked; but in 1827 and 1828, after better ventilation was established, diminution and occasionally suppression of the lochia were observed; the disease having then assumed the synchochoid or intermediate grade of impaired vital power. M. DUCÈS states (*Journ. Hebdom. de Méd.*, t. i., p. 348), that in eighty-nine cases observed by him at the Maternité, there were twenty-five instances of suppression or diminution of the lochia during the rigour, twenty-seven of suppression or diminution in the progress of the disease, and thirty-seven instances in which there was no diminution, but were sometimes an augmentation of the discharge.

[* Professor AUSTIN FLINT, of Buffalo, maintains (*New York Journal of Medicine*) the following two prominent propositions in relation to the epidemic puerperal fever which prevailed in that city in 1844: 1. That the disease is an essential fever, and not a merely modified form of peritonitis or metritis; and, 2. That it is a fever having a close analogy with that of erysipelas. In corroboration of the latter, the author narrates the following case: Two ladies were in constant attendance upon a friend who died of puerperal fever. In the course of three days they were both taken ill, one with severe erysipelas, the other with premonitory symptoms of the same disease, and which were fortunately dissipated by the action of an emetic. A labouring woman who was employed to wash the clothes of the same patient, having received a slight scratch on the hand while so doing, was attacked with erysipelatous inflammation of the absorbents, and died after a short illness.

M. COLOMBAT D'ISÈRE speaks of puerperal fever under two forms, that of puerperal peritonitis and uterine phlebitis; and in the treatment of both forms, both he and his translator, Professor MEIGS, lay great stress upon the inflammatory origin, and consequently strongly recommend both general and local blood-letting.]

210. In some cases in which the lochia is diminished, an increase of it takes place after a judicious treatment. But a return of the lochia is not always followed by amendment; and when this result ensues, the return of the lochia is evidently the consequence of the amendment, and not the cause of it. In estimating the value of this indication, the time which has elapsed from delivery, and the state of this discharge from the period of delivery, should be considered. It may be stated, as a corollary, that the state of the lochia varies in different epidemics and forms of the malady, and in different individuals even in the same epidemic or endemic prevalence of it, according to its more or less inflammatory character, and to the kind of complication which marks its commencement or progress.

211. (*b*) The secretion of *milk*, if established before the attack of the most malignant states of the disease, is generally not influenced thereby; and if the accession of the malady precede the appearance of the milk, the accession of this secretion may occur in the course of the malady. I have seen the breasts full of milk at the period of dissolution, although they appeared more or less flaccid. In all respects, this secretion generally presents the same relations to the forms and states of the fever as have been just stated in respect of the lochia.

212. (*c*) A correct interpretation of the *pulse* is of the utmost importance in the estimation of the nature, forms, and states of this malady; and is not less so as regards the diagnosis and prognosis. A very frequent pulse—a pulse above 110 after parturition, should always be viewed with suspicion, if the acceleration cannot be accounted for, or referred to mental emotion or physical excitement, although no other symptom be complained of; and inquiries, as well as a more particular examination, should be directed to the secretions and excretions, to the condition of the uterus, and to the sensations excited by an examination of the abdomen and hypogastrium. If, in connexion with great acceleration, the pulse is open, expansive, and soft, the inquiries now suggested are the more necessary, especially if pain, fullness, tenderness, or distention in any part of the abdomen be also present. If the pulse rise above 120, the probability of the accession of puerperal fever is much greater, the type or character of the fever being indicated by the tone or resistance furnished by the vessel, and by the various existing symptoms. In the more malignant states of the malady the pulse becomes remarkably frequent, often so as hardly to be counted, and at the same time open, expansive, soft, or fluent, as if insufficiently filled with blood. There are also observed, in connexion with this pulse, a free and offensive perspiration, copious discharges from the bowels and from the stomach, while both the milk and lochia are abundant. These evacuations must necessarily soon leave the vascular system more or less deficient in its contents; and this deficiency must be the more serious, the greater the loss of blood during parturition, and the lower the patient is kept during the first days after delivery, as too frequently directed by accoucheurs, who are more capable of adopting a fashion or mode than of thinking rationally, uninfluenced by hypothesis, and

conformably with the dictates of sound common sense. If we duly consider the effect which the abundant evacuations observed in the course of the more malignant form of puerperal fever must have in reducing the quantity of blood circulating in the vessels, and view this reduction in connexion with the impaired tone or contractile power of the vascular system generally, the want of due relation between the quantity of the blood and the capacity of the vessels containing it must necessarily appear as no mean cause of the leipothymia, faintings, or sinkings so generally observed, and of the rapid progress of the disease to dissolution, especially when a lowering or depletory treatment is adopted.

213. (*d*) In the more malignant states of puerperal fever *vomiting* is almost a constant symptom. It is generally present from the commencement, and frequently consists at first of a greenish-yellow ropy fluid, afterward becoming greenish-brown, and lastly nearly black, watery, and turbid. A dark greenish fluid is often ejected from the beginning. At first the vomitings are attended by considerable retchings; but as the disease advances to a fatal issue, the matters are belched up with little or no effort. Vomiting sometimes occurs at the commencement of the disease, then subsides, and is followed by diarrhœa, and afterward recurs in its worst form, the diarrhœa frequently continuing also.

214. (*e*) The states of the *bowels* and of the *evacuations* vary considerably in the different forms of puerperal fever. The intestinal irritation, or gastro-enteric disorder, which has been viewed by some writers as a form of the disease, is merely a symptom which is often more or less prominent in all the varieties, but more especially in the most malignant and rapidly fatal, in which depression of vital power, alteration of the blood, and loss of vital cohesion of the tissues are the most manifest phenomena. In the more inflammatory, and in the intermediate or synchochoid forms, the stools are at first bilious, feculent, or frothy, sometimes costive, or not relaxed, or irregular; but they are often relaxed and irregular, or offensive as the disease advances. In the more malignant states the evacuations are generally dark-green, greenish-brown; in a few cases almost approaching to black. They are commonly, also, fluid, very copious, occasionally slimy, and usually containing numerous small pieces of soft albuminous flakes mixed with them. They are always extremely offensive. Toward the fatal close of the more malignant cases they are often passed involuntarily.

215. *b. The state and appearances of the blood* vary most remarkably in the different varieties of puerperal fever. In the more inflammatory, particularly when the sthenic diathesis obtains, and the disease presents the characters of peritonitis or hysteritis, the blood does not differ materially from the states of this fluid usually seen in other inflammations of serous or fibrous structures. It is chiefly in the inflammatory form that an opportunity of examining the blood, while the patient is living, is afforded the physician. But I have been called to cases of the malignant form, produced by infection, in which venesection has been practiced, and opportunities have thus been furnished, fatally to the pa-

tients, of observing the appearances of this fluid in that form during their lives.

216. (a) In the case of a patient who exhibited the first symptoms of *puerperal peritonitis* on the evening of the second day after delivery, the pulse being very quick, hard, and full, the respiration rapid, with heat of skin and thirst, Dr. SIMON found that the blood formed a tolerably firm clot, and was covered by a buffy coat of a line and a half thick, the chemical analysis furnishing very nearly similar results to those about to be adduced from ANDRAL and GAVARRET. These physicians made eight analyses of the blood in four cases, one of *peritoneal fever*, the others of *metro-peritoneal*. Two of the cases terminated fatally, and in these a large quantity of purulent matter was found in the abdominal cavity. The following are the results:

	Venesections.	Water.	Solid residue.	Fibrin.	Blood corpuscles.	Solid residue of serum.
1st case	1	787.2	212.8	5.5	122.8	81.5
	{ 1	822.9	177.1	5.4	88.3	83.4
2d case	{ 2	831.6	168.4	5.3	73.6	89.5
	{ 3	851.0	149.0	3.6	60.5	84.9
3d case	1	786.4	213.6	7.2	117.0	89.4
	{ 1	789.4	210.6	3.8	120.0	86.8
4th case	{ 2	802.7	197.3	4.7	109.5	83.1
	{ 3	813.5	186.2	6.1	100.3	80.1
Healthy blood	}	790.0	210.0	3.0	127.0	80.0

217. The second case, which proved fatal, revealed puriform effusion into the peritoneal cavity. The fourth case did not manifest symptoms of *metro-peritonitis* until the second bleeding was ordered, this disease having been fully developed on the occasion of the third bleeding, when the quantity of fibrin in the blood was greatest. In cases of *metro-peritonitis* quoted by Dr. DAY, from the analysis of SCHERER, HALLER, BECQUEREL, and RODIER, the blood presented a similar increase of fibrin, and a much greater diminution of blood-corpuscles.

218. (b) In cases of *metro-phlebitis puerperalis*, the clot of the blood drawn from a vein was, according to EEBERT, large, and more or less concave. It was covered either with a thin, true buffy coat, or more frequently with a thick and often discoloured stratum of gelatinous substance, forming a false buffy coat. Gelatinous coagula of a similar nature were also frequently seen floating in the serum. The microscope often detects pus in the blood in the course of the disease. In two instances, in which the blood was analyzed by SIMON, in this form of puerperal fever, a nearly similar increase of fibrin and diminution of blood-corpuscles to the above were found. The quantity of albumen and of fat in the blood was much augmented, the former amounting to 103.35 and 112.77, the latter to 3.12 and 4.32.

219. (c) I am not acquainted with any analysis of the blood in the most malignant form of puerperal fever, unless that which Dr. DAY adduces from HELLER, who states that the blood was of a very dark brown colour. The clot was dark, of a loose consistence, and covered by a buffy coat, over which was a delicate membrane, which presented under the microscope a finely granular appearance, and fat vesicles.

The serum was turbid, but after standing for some time became clear; its reaction was alkaline; its specific gravity 1025. The fibrin was 5.16; the blood-corpuscles 77.52. According to BECQUEREL and RODIER, the cholesterine and phosphates are increased.

220. The appearances of the blood in puerperal fever will necessarily vary not only with the form and state of the disease, but also with the period or stage at which it has been taken away. During 1821, 1822, 1823, 1824, and 1825, and even in some following years, when the mischievous writings of ARMSTRONG, and other insufficiently experienced authors, had misled those who trusted to ephemeral and unworthy authority, blood-letting had been resorted to in all cases of this disease to which I was called, some of them having been actually moribund, or even dead before I reached them, in consequence partly of the practice; and on every occasion I was struck by the peculiar faint odour and very dark hue of the blood; by the very soft state of the clot when the blood did separate into crassamentum and serum; by the appearance, which occasionally presented itself, of a mass exactly resembling, in colour and consistence, a common jelly, the colouring matter covering the bottom of the vessel in the form of a precipitate; and by, in some instances, a slight separation only of serum, the large, loose, or gelatinous crassamentum consisting chiefly of this jelly-like matter, the lowest stratum of which contained the black or dark brown precipitate of colouring matter. These appearances of the blood were presented in several cases in the hospital in 1823, and three or four subsequent years, in which cases blood had been taken before I saw the patients. It may be here remarked, that I have seen many cases of this form of the disease in which leeches had been applied to the abdomen; but in nearly all, and especially in those which occurred in the hospital, the blood which flowed from the bites did not coagulate; and great difficulty, amounting almost to an impossibility, of arresting the bleeding from them, was generally observed, owing both to the state of this fluid and to the impaired vital cohesion of the tissues characterizing the advanced stage of the malignant form of this domestic pestilence.

221. V. APPEARANCES AFTER DEATH.—The lesions observed after death from puerperal fevers vary remarkably, according to the type, and form, and complication of the malady; the mode and nature of the infection; and the manner in which the infection appears to have invaded the frame. In the more *inflammatory type*, or in those cases which present much of a *sthenic diathesis*, in which vascular reaction are more developed, and the pulse less frequent and attended with more tone and resistance, the alterations of structure, whether limited to the *uterus* or *appendages*, or to the *peritonium*, or to all these parts, approach more or less closely to those which are consequent upon primary and uncomplicated inflammations of these structures, and are not materially, if at all different from those described when treating of inflammations of the *uterus*, *ovaria*, and *peritonium* (§ 80-98).

222. A. In the *asthenic* or more *malignant varieties* of this distemper, the alterations of structure present different characters from those ob-

served in the more sthenic states, or in those cases which are characterized by greater vascular reaction and vital resistance. In the most malignant of these (§ 198, *et seq.*), the changes consist chiefly of impaired cohesion of the tissues generally, often with more or less of a turbid serous effusion into the serous cavities, more especially into the peritoneal cavity. I examined several bodies after death from this state of the disease in the years between 1822 and 1830, and during that period, as well as subsequently many others, in which the fever manifested an intermediate grade of intensity between that state and the more sthenic or inflammatory, I made notes at the time of the appearances; and the description of them are derived from these sources.

223. *a.* It was but rarely that death took place previously to the effusion of fluid into the *peritoneal cavity*. Such an occurrence, however, was sometimes observed in the most malignant form of the malady, especially when the powers of life rapidly sunk, and the patient expired within thirty-six or forty-eight hours. In these cases the peritoneum was finely ingested or congested throughout, especially its venous capillaries; but the injection was not generally diffused; it was usually in the form of spots, patches, or streaks. Those parts of this membrane which were closely in contact, as if pressed upon, were less vascular. The congested patches were generally of a reddish-brown, or livid hue; and the peritoneum throughout of a dirtier and more unhealthy colour than usual. The membrane was soft, easily torn; and with this loss of cohesion it appeared somewhat thickened. These changes were not limited to a single or to several situations, but were general. In some cases, however, they were most remarkable in the peritoneal coat of the intestines, in others in the *omentum*, which was often contracted, or pushed upward, very much softened, of a reddish brown colour, and sometimes so readily torn as to be incapable of sustaining much more than its own weight. This diminution of the usual cohesion of the peritoneum was occasionally attended by little or no effusion in the most rapidly fatal cases, or merely by a delicate film of exudation most remarkable in the open interstices between the convolutions of the intestines and viscera. This film of exudation may be unobserved until the finger is passed over the surface, when it will be collected in a sensible semifluid mass. In several of these cases the inspection was made while the body was still warm.

224. In these cases there was but little fluid effusion, not above two or three spoonfuls, and that was of a dirty, light-brown, or reddish-brown hue, or of a whey colour; more rarely it resembled a sanguineous ichor; but it always possessed an offensive odour. In some instances, at least, it may have been the result of *post mortem* transudation. In cases in which life continued longer to resist the fatal tendency of the malady, or where attempts at reaction had partially taken place, with a nearly similar state of the peritoneum to that now described, there was a greater or less quantity of fluid effused. This fluid, in the more rapidly fatal instances, and where depression of the powers of life, with flaccidity of the muscles generally, was most remarkable, had a dirty or muddy, or

sero-sanguineous appearance and fetid odour in some cases; and was more abundant in others, and was then either whey-like or of a dirty yellowish tinge. When death had not occurred until about the end of three or four days, the effused fluid was often very abundant, consisting of a curdled substance, of which the more consistent part nearly resembled recently curdled milk, the curd being soft, gelatinous, and friable, of a cream colour, or approaching it; and the serous portion closely resembling a pale whey. This effusion was generally most abundant in the pelvis, in the more depending situations and open spaces between the viscera, and convolutions of the bowels. It is obviously this state of the effusion which induced several French physicians to ascribe the malady to metastasis of the milk. In other cases the effusion was equally great, but it presented the appearance of an emulsion of a more or less deep yellow, yellowish-green, or grayish-yellow hue. In some instances it consisted of a dirty serum, with semifluid, albuminous, or puriform matter mixed with the serum. Occasionally the effused liquid was almost puriform, or sero-puriform.

225. *B.* In those cases in which the disease, owing either to the robust constitution of the patient, or to the less intense action or concentration of its exciting cause, has not rapidly sunk the frame into dissolution without some degree of sthenic vascular reaction, the peritoneum, in addition to a large effusion of a serous or whey-like fluid, containing flakes or masses of lymph, or of a puriform or albumino-puriform matter of various sizes floating in it, was very generally covered by a thick coating of lymph, or of a substance of a yellowish or greenish-yellow colour, of a soft consistence, in some places slightly agglutinating the opposing surfaces, in others occasioning no adhesion, however slight, and containing in the open spaces the fluid just described. These exudations were most abundant in the pelvic portion of the cavity and lower abdomen, and sometimes also in the vicinity of the liver, spleen, and diaphragm, and around the omentum, which seldom presented the same appearances in two cases. The odour of this effusion was peculiar and disagreeable, and it, as well as the fluid previously described, was often so acrid as to irritate the backs of the hands of the examiners of the body.

226. *a.* Even in cases of the greatest effusion, the *peritoneum* was often the most devoid of redness; the congested state of its capillaries, particularly of the venous capillaries, noticed in those cases which terminated most speedily and without effusion, was observed only in parts, streaks, dots, or spots, its surface being of a dirty grayish colour. This membrane itself was opaque, thickened, and somewhat softened, and readily torn, more especially in those parts reflected over the viscera of the pelvis and lower abdomen, but sometimes, also, in the iliac fossae, even more remarkably in the omentum, and occasionally in the mesentery, and in that reflected over the abdominal parietes. In a few instances only were slight ecchymoses under the peritoneum remarked. In rare cases only has gangrene of the peritoneum been observed, and only in those portions reflected over the fundus of the

womb and the appendages, and over the iliac fossæ; and in still rarer instances has it existed in the peritoneal covering of the bowels. In some cases, probably, this change had taken place, or become more marked, after dissolution. The external or adhering surface of the peritoneum, or, rather, the *connecting cellular tissue*, in the most rapidly fatal cases, was sometimes slightly oedematous, or infiltrated by a serous or sanguineo-serous fluid, and this was most frequently seen in the omentum, when it was remarkably softened, and in the Fallopian tubes; but it was associated with no farther change in the uterus, appendages, or veins than slight softening of the former, from participation in the loss of vital cohesion so remarkable throughout the frame. In cases which had continued three or four days, and in which vascular reaction had partially appeared, slight infiltrations of a serous or a sero-sanguineous, or a sero-puriform, or even of a pus-like matter under this membrane were found, occasionally so minute as hardly to be detected, until it was squeezed out upon dividing the parts. When thus slight the peritoneum was opaque, and had a dirty, macerated appearance. These infiltrations were most remarkable under the reflections of the peritoneum over the pelvic viscera and iliac fossæ, and in the omentum and folds of the mesentery.

227. *b. The viscera* enveloped by the peritoneum were frequently sound, excepting their impaired vital cohesion, and old or pre-existent lesions, and the changes observed in the *sexual organs and their vessels*, which were the next in importance to those found in the peritoneum. These organs in the most malignant and most rapidly fatal cases, as in those which occurred in the hospital during 1823, 1824, and 1825, generally presented no farther change than remarkable relaxation, flabbiness, or softening, without any purulent matter having been found in the vessels or sinuses of the *uterus*, this organ being but little or not at all contracted, although several days had elapsed from delivery. The peritoneal covering presented the changes just described, in some cases in a great degree, and in those latter the uterine appendages participated very remarkably.

228. These were often the principal changes in the most malignant states, or when the disease at its commencement was not localized in any particular region of the pelvis or abdomen, as in those cases which occurred in the most unfavourable circumstances of deficient ventilation and contamination of the air. But in the less rapidly fatal or intermediate states of the malady, where the duration of the morbid action admitted of the development of various complications, or when the disease appeared to originate in the absorption of morbid matter from the uterus and vagina, or from contamination in these situations, not only were those organs more or less altered, but serious lesions were observed also in remote parts. The *uterus* was generally flabby and relaxed; its substance softened throughout, but most remarkably toward the inner surface, or infiltrated by an ichorous, sero-puriform, or purulent matter; its *sinuses* and *veins* containing also puriform matter, or a substance resembling that found in the uterus, a similar matter irregularly filling or distending the veins and *lymphatics*

not only of the viscus, but also of all its appendages. None of the cases which I examined during 1823 and 1824 presented these changes in the vessels; the first case in which I found the vessels of the uterus and its appendages inflamed or containing purulent matter, occurred in the spring of 1825, Mr. MULLINS having assisted me in the autopsy.

229. The inner surface of the womb was often covered with a gelatinous layer coloured by partially decomposed blood, or by a dark green, or greenish brown exudation of soft lymph, sometimes by a thick purulent coating of a greenish yellow or yellowish brown matter; these matters were generally offensive, or even had become putrid at the earliest period of inspection. The changes in the uterus were always most remarkable in the part where the placenta was attached, whether those seated in the substance of the organ or in the veins and sinuses. The *Fallopian tubes*, *broad ligaments*, and *ovaria* were swollen, injected with blood, infiltrated with an ichorous serum, or with pus; their vessels charged with similar matter, and their substance more or less softened, and readily broken down.

230. *c. The veins and sinuses* of the uterus are frequently changed, and the *lymphatics* sometimes also implicated, the changes occasionally extending to the whole sexual apparatus and along the spermatic and renal vessels to their trunks. The coats of the vessels, in a few cases, were thickened, the canals partially obliterated, or their parietes contracted in parts and dilated at intervals. The internal surface of the veins was sometimes covered with a false membrane, although it was pale when examined. The adjacent cellular tissue was often infiltrated, or contained purulent or sero-puriform deposits, especially in the iliac fossæ. These changes in the coats and contents of the vessels were in some instances limited to the uterus, in others extended to the appendages; and they occasionally did not exist in the uterus, but were found in the latter parts; and in a few cases they were observed only or chiefly in the spermatic or renal veins. Puriform or other morbid matters were, in a few instances, most abundant in the lymphatics, forming in them small pouches, and more rarely they were found in both the veins and lymphatics. The veins often contained not only ichorous or puriform matter or pus, or these more or less mixed with small, grayish, or light-brown coagula, or with blood variously altered, but generally fluid or grumous, without any marks of inflammation of their parietes.

231. *d. The heart* was usually flabby, softened, or friable. In the more malignant cases these changes were often remarkable; and the endocardium was often deeply stained, this change of colour generally extending to the arterial trunks. The cavities of the heart sometimes contained fluid dark blood. A small quantity of a dirty serum, or of a sero-sanguineous fluid, was occasionally effused in the pericardium, especially in the most rapidly fatal states of the malady.

232. *e. The diaphragm*, especially at its peritoneal aspect, partook of the changes observed in the peritoneum. Slight infiltrations of sero-puriform or sero-sanguinolent matter were seen in a few instances in the connecting cel-

lular tissue, but they rarely extended into the muscular structure. The *mediastinum* was sometimes infiltrated with a similar matter. The *pleura*, in some of the most malignant cases, presented nearly the same alterations as were found in the peritoneum, more especially the diaphragmatic and pulmonary *pleura*. This membrane was more easily torn than usual, or was softer, or appeared in places oedematous and discoloured, owing to infiltrations of a dirty serum or of a sero-sanguineous fluid in the connecting cellular tissue. The pleural cavities contained, in some cases, a turbid or whey-like serum—more rarely a scanty sero-sanguineous effusion. In some of the most rapidly fatal cases little or no effusion was found, while in some of the more prolonged malignant cases the effusion in, and the state of, the *pleura* were similar to those of the peritoneal cavity (§ 223, *et seq.*), excepting that the quantity of the fluid was much less. In those cases in which the changes were seated chiefly in the uterus and appendages, and in the more prolonged and sthenic form of the disease, the *pleura* presented either slight or no material alteration.

223. *f.* The *lungs* were generally more or less congested with dark fluid blood, especially at their posterior or more depending parts. Their substance was soft and friable in the most malignant states of the malady. In the more prolonged cases, and when uterine phlebitis existed, they sometimes contained small puriform deposits or infiltrations, or larger collections or abscesses, with grayish hepatization or other changes consequent upon congestive pneumonia.

224. *g.* The *digestive canal* presented few changes in its mucous surface. Sometimes, however, inflamed patches were observed; and more or less softening of the mucous membrane, especially of the *stomach*, was not infrequent. Occasionally the softening of this organ was attended by erosions and perforations; and more frequently a brownish, transparent, and gelatinous substance was found between the mucous and muscular coats. Softening and perforation of the stomach has been more frequently observed by Dugès and others than I have seen them. This physician thinks that the brownish viscid matter exuded from the perforated portion of the stomach acts upon the adjoining parts as a caustic, softening, dissolving, and perforating them. But these changes, as they respect the stomach and adjoining viscera, are, in my opinion, in a great measure *post mortem*, and are much more rarely observed when the inspection has been made a few hours only after death. The *intestinal parietes* seldom presented other changes than deficient physical cohesion, especially in the most rapidly fatal cases. In a few of longer duration, the glands of Peyer and Brunner were enlarged or otherwise changed; but I rarely observed ulceration of them, or in their vicinity. The whole digestive canal was remarkably distended with air, and contained much brownish or brownish-green fluid matter; that which was found in the stomach and oesophagus being similar to the matters thrown up shortly before death.

225. *h.* The *liver* was covered by the matter described above as being found in the perito-

neum; and a layer of soft lymph, or of a substance similar to that covering the fundus of the uterus, was often interposed between it and the diaphragm, or between it and the stomach, even, in some instances, where the abdominal portions of the peritoneum were comparatively but little altered. The substance of the organ was often softened, more friable than natural, in some cases congested; in others, pale, soft, as if it were parboiled, and deficient of blood. In rare instances it contained purulent deposits. The *gall-bladder* often contained much greenish bile, which was occasionally thick andropy. The *spleen* was softened, somewhat enlarged, and in the more malignant cases it was so friable and soft as hardly to admit of being handled, even when the examination was made while the body was still warm; and the blood contained in it resembled treacle.

226. *i.* The peritoneal coat of the *kidneys* generally participated in the changes existing in other portions of this membrane. The veins of the kidneys in some instances contained puriform matter mixed with grumous blood; and deposits of pus were found in the substance of the kidney generally on the same side as that in which the ovarium and ligaments were most altered or their veins inflamed. The *brain* and *membranes* were rarely diseased, even in cases attended by delirium. Slight softening was met with in a few instances of the more malignant form of the malady.

227. *k.* Effusions of sero-puriform, or purulent matter in the *joints*, especially the hip, elbow, and knee-joints, and more rarely into the shoulder, ankle, or wrist-joints, were met with in the states of the disease complicated with uterine phlebitis; and when the case was protracted beyond five or six days, infiltration of a sero-puriform or sero-sanguinolent fluid into the cellular and muscular tissues were sometimes observed. These fluids were hardly ever encysted; they always infiltrated, softened, and, as it were, decomposed the texture which they infiltrated, the parts around the softened places gradually passing to a healthy appearance. The muscular structure presented a pale-brown hue where it was thus softened and infiltrated; the skin was lurid or dusky, and the part swollen or boggy, occasionally to the extent of some inches. The soft solids passed rapidly to decomposition; the internal viscera, especially the abdominal, being the first to evince the change. In the more malignant form of the malady this change commenced before the animal warmth had altogether departed. Nearly all my examinations were made before twenty-four hours from dissolution had elapsed, most of them from eight to twelve hours after death. I believe that several of the changes which have been described by some writers have taken place after death, or at least have become more remarkable during the period between this event and inspection of the body, for decomposition follows death more rapidly in this disease than any other.

228. *ii. Results of Post-mortem Examinations made by some other Physicians.*—A. M. Dugès advances the results of 341 deaths. In these peritonitis was observed 266 times. Of these 266 peritonitic cases the uterus was affected in three cases out of each four. But M. Dugès remarks, that if the cases in which pus was found

in the veins, and which he believes, with considerable probability, not to have been cases of uterine phlebitis, be abstracted, the ratio of *metritis* would be very remarkably lowered, and reduced to 29 in 266, or 1 in 9. He states that the *ovaria* are affected in the proportion of one to seven cases; and that in the 266 cases the *stomach* was perforated in 10; the *stomach* and *intestines* were inflamed in 4; there was single or double *pleurisy* in 40; *pericarditis* in 6; *arachnitis* in 1; *purulent deposits* in muscles in 8. It is not improbable, however, as stated above, that the perforation of the *stomach* in some of the cases, at least, was either a post-mortem change, or was increased after death.

239. B. The researches of M. TONNELLÉ are more precise.—(a) Of 222 dissections he found *peritonitis* in 193; alterations of the *uterus* and *appendages* in 197; lesions of both the *uterus* and *peritoneum* in 165; the *peritoneum* alone affected in 28; *uterus* alone in 29.—(b) The alterations of the *uterus* and *appendages* were, simple *metritis*, 79; superficial softening, 29; deep softening, 20; inflammation of the *ovaries*, 58; inflammation of the *ovaries* with abscess, 4=190.—(c) The alterations of the *vessels* were, pus in the veins in 90; pus in the *lymphatics* in 32; pus in the *thoracic duct* in 3; suppurative of the *lumbar* and *inguinal glands* in 9=134.—(d) The combinations of these lesions were, *suppuration of veins* and *uterus* in 32; *suppuration of veins* and *putrescence of uterus* in 11; *suppuration of veins* with *metritis* and softening in 5; *suppuration of veins* with *peritonitis* alone in 34; *suppuration of veins* alone in 8=90. *Suppuration of lymphatics* and *veins* in 20; *suppuration of lymphatics* and *uterus* in 13; *suppuration of lymphatics* and softening of *uterus*, 6; *suppuration of lymphatics* and simple *peritonitis*, 3; *suppuration of lymphatics* alone, 2=44. *Inflammation of ovaries* with *peritonitis* alone, 29; with various uterine lesions, 27; with *metritis* alone, 8; with softening of *uterus*, 7; with *suppuration of vessels*, 12; with all the preceding lesions, 6=89.—(e) The *secondary affections* were, in the *pleura*, *pleurisy*, 29; *effusion of blood*, 6; of *serum*, 8=43. In the *lungs*, *pneumonia*, 10; *tubercles*, 4; *abscess*, 8; *gangrene*, 3; *pulmonary apoplexy*, 2=27. In the *heart*, *dilatation*, 4; *hypertrophy*, 3; *pericarditis*, 1; *hydro-pericarditis*, 6=14. In the *digestive canal*, softening of the *stomach*, 8; *perforation of stomach*, 5; *ulceration of stomach*, 5; *gastro-enteritis*, 5; *entero-colitis*, 1=24. In *other parts*, *abscess of the liver*, 3; of *pancreas*, 2; *abscess in muscles*, 14; *infiltration of blood in muscles*, 3; *abscess in pelves*, 2; in the *elbow*, 2; in *knee*, 6; *alteration in cellular tissue of pelvis*, 6; *sanguineous infiltration*, 2=40.

240. C. Of forty-five dissections made by Dr. R. LEE, the *peritoneum* and its *appendages* were inflamed in 32; the *uterine veins* in 24; softening of the *uterus* in 10; pus in the *absorbents* in 4. The *peritoneum* was not altered in thirteen cases of the forty-five; and there was no *phlebitis* in seventeen. Dr. COLLINS found, in thirty-seven dissections, the *peritoneum* more or less affected in all; and in seven fluid was effused in the *thoracic cavities* similar to that found in the *abdomen*. The *effusion* into the *peritoneal cavity* was of a *straw-colour* in twelve, and *sero-purulent*, or of the *consistence of thick cream*,

in eighteen. It consisted of a *sanguinolent serum* in seven, and had a *glutinous feel* when rubbed between the *finger and thumb*. All these last cases were rapidly fatal, and no *coagulated lymph* was found in them. In the other cases *lymph* was deposited in large quantities, and generally, but more especially in the vicinity of the *uterus*. "The *uterus* in the great majority was quite natural in appearance; in some it was soft and flabby, and in a few unhealthy matter was found in the *sinuses*. The *ovaries* in many instances had suffered much from the effects of inflammation; being generally enlarged, and so softened as to be broken down by the least pressure." (P. 398.)*

241. VI. PATHOLOGICAL INQUIRIES RESPECTING PUERPERAL FEVERS.—I. *Is inflammation or alteration of the blood-vessels, or absorbents of the uterus, a necessary consequence of the passage or imbibition of morbid matters, or of other infecting agents from the sexual passages into the circulation?*—Although *uterine phlebitis* exists chiefly in cases which originate in an *extrinsic* or *intrinsic* local infection—which are caused by an *internal* or *external* contaminating or infecting agent—and occurs less frequently or more equivocally when the malady is produced by the general infection of the frame received through the medium of the *respiratory organs*, I nevertheless believe that, in the latter class of cases, more especially if the patient has experienced *flooding*, or is vitally depressed, or continues under the influence of an *impure* or *infected air*, *morbid matters* or *fluids* may be imbibed by the *uterine vessels*, or absorbed from the *sexual passages* and carried into the *circulation* to such an extent as to contaminate the *circulation* and infect the whole frame without producing any inflammatory alterations of the *vessels*. I was so impressed by the symptoms and course of the disease, and by the examination of the bodies after death, in 1823 and the following years, as to infer at that time, and subsequent experience has confirmed my belief, that *morbid matters*, or altered or *putrid fluids* are imbibed, in the circumstances just mentioned, and passed into the *circulation*, producing the effects now specified without inflaming the *vessels*, or producing such a change in their *internal surface* or in their *parietes* as may be recognised by the unaided senses; and that the *passage of these matters from the uterus into the circulation* may take place so rapidly and so efficiently as to produce their effects in so malignant a manner, and in so short a time, as not to admit of the production of the usual alterations consequent upon irritation of the *vessels* along which these matters have passed. From this it may be inferred that the *absence of change in the uterine vessels* is not a conclusive proof, in rapidly fatal cases of *puerperal fever*, that *morbid matters*, or altered fluids, or other infecting agents have not been imbibed from the *uterus* and carried into the *circulation*. When the imbibition of such matters or agents takes place without causing, in the first instance, irritation, inflammation, and its consequences in the *vessels*, there is every reason to believe that the effect upon the frame

* It is unnecessary to quote American authorities relative to the pathological appearances found in *puerperal fever*, as they closely correspond with those described by our author.]

will be the more immediate and intense, owing to the absence of these changes, and to the free passage thus afforded to the morbid agents about to enter into the current of the circulation. Whereas there are equally cogent reasons for concluding that, when the morbid matter excites inflammation of the vessels which imbibe it, the passage of it into the circulation will be either altogether prevented, or retarded, or diminished by the inflammation thereby produced.

242. ii. *Are the uterine vessels actually inflamed in all, or even in the majority of instances, in which they contain pus, puriform, or other morbid matters?*—When the disease is not arrested by the prompt adoption of rational and decided means, or when such means have not been employed early, or not at all, then the altered fluids, an offensive or putrid lochia, or the secretion produced upon the internal surface of the uterus may be imbibed by the vessels, and either inflame them, or contaminate the blood without inflaming them, as inferred above (§ 241), or may both inflame the vessels and contaminate the blood. That the vessels are inflamed, and present the changes consequent upon inflammation, are among the most frequent changes observed in this disease; and that matters similar to those covering the internal surface of the uterus, or in its cavity, are also found in the veins, and that even puriform matter is seen in these vessels, sometimes without any marks of inflammation of the containing vessels, are undisputed facts, and serve to confirm the view, already stated, that these matters may pass into the circulation and change the blood without leaving any signs of phlebitis. It is not improbable that, when the passage of morbid matters from the cavity of the uterus into the veins takes place towards the close of life, or when it has been increased at this period of the malady, the change of the blood remaining in these vessels will then be more manifest; and the contents of the vessels will more closely resemble the morbid matters existing in the uterus, or will be more or less altered, owing to admixture of these matters with the blood; and that, while the matters found in the vessels will thus be much altered, the state of vital power and vascular action at this period of the malady will preclude the occurrence of inflammatory changes in the vessels by which these matters were imbibed. It may, therefore, be concluded, 1st. That the morbid matters found in the uterine vessels may be the products of inflammation of these vessels, and in this case inflammatory appearances or changes are also found in the coats of the vessels. 2d. That they may have been imbibed from the uterus, and their presence may have caused irritation and inflammatory alterations in the vessels; and, 3d. That they may be imbibed by the vessels, pass through them, or be retained in them, especially at an advanced period of the disease, or near the close of life, and yet fail of producing any marks of phlebitis, although contaminating the blood and all the frame.

243. iii. *Are the softening and other changes often found in the substance of the uterus and of its appendages the results of inflammatory action, and to what other pathological conditions may they be imputed?*—(a) Certain of these changes are the undoubted consequences of inflammation,

others are the results of a very different state of vital and vascular action. Even the most obviously inflammatory lesions are not referable to pure sthenic action, but rather to an asthenic or diffusive state, unattended by the exudation of a healthy lymph, and characterized by its tendency to spread, to soften, dissolve, or disorganize the parts which it affects; and to infiltrate them with a sero-puriform or sero-sanguinolent matter. The flabbiness of the parts, their swollen, softened, and infiltrated states, their friable and almost putrescent conditions in some instances, and the deposits of puriform matter, without any cyst or exudation of firm lymph in others, evince the asthenic character of the vascular action, of which these changes are the results. In some cases, especially when vital power is less depressed and the disease is more prolonged, the matter found in the substance of these organs is more consistent, in larger collections, and more nearly approaches that produced by sthenic action.

244. (b) The depression of vital power and contamination of the circulation caused by the exciting or infecting agents, when they operate energetically, occasion changes in the lochia, or so affect the fluids exuded from the internal surface of the uterus and sexual passages as not merely to irritate the parts with which they come or remain in contact, but also to contaminate them locally, so as to partially dissolve their vital cohesion, to soften and almost liquefy or putrify them, even before life has taken its departure. This local contamination thus supervenes upon the general infection produced by the poisonous agent, and in proportion to the intensity of its operation, relatively to the remaining power of vital resistance, will be the extent of change; of softening or disorganization that will result in the uterus, in the ovaria, and in the ligaments, the mischief extending, moreover, to the peritoneum, and spreading throughout its surface with a rapidity proportionate to the reduction of vital power and to the contamination of the circulating fluids. In many of these cases the softening and disorganization of the uterus and appendages, especially of the ovaria, are carried to the utmost extent. If, however, the examination of the body be delayed beyond eighteen hours after death, these changes may be viewed as partly *post mortem*.

245. iv. (a) *Is the peritonitis existing in the majority of cases of puerperal fever a primary morbid condition? (b) or is it consecutive of the infection and febrile action? (c) or is it the result of an extension of the morbid action from the uterus and appendages to this membrane?*—These are questions by no means easy to solve, for they admit of being answered both affirmatively and negatively, inasmuch as there is reason to believe that the procession of changes is different, or even opposite in different cases or forms of the malady, and according to the channels through which the causes invade the frame.—(a) Instances have occurred in which I have believed the disease to originate in inflammation of the peritoneum, of greater or less extent, the accompanying fever preventing varying grades of action between the sthenic diathesis on the one hand, and the asthenic on the other. The peritoneal affection may be primary, and yet appear as a complication, or as a

consecutive lesion, especially when it occurs very soon after labour, or is developed with the reaction following the shock produced by parturition. Indeed, both the fever and the peritoneal affection may be coetaneously produced; the latter, commencing as reaction, follows the depression caused by delivery, or by the exciting causes of the malady. This latter mode is probably that which actually obtains most frequently, whether the disease is characterized by sthenic or inflammatory action, or by asthenic action, or marked deficiency of vital power. But, as reaction is adynamic and imperfect in the latter cases, the prominent affection of the peritoneum in these is modified accordingly, and presents alterations varying in extent and character, especially as regards the fluid effused, with the intensity or concentration of the cause, with the state of vascular action and vital power, with the constitutional peculiarities of the patient, and with the several circumstances of the case.

246. (b) That the peritoneal affection may, however, be consecutive of the constitutional infection and febrile action, at least in some instances, is shown by the fact that death has taken place, although in comparatively rare cases, before the peritoneum has presented a more remarkable change than other parts—before exudations of lymph or fluid in its cavity had supervened; such cases having occurred in the same ward, and in similar circumstances, with those in which the peritoneal symptoms and effusion into the cavity were most prominent; in some of these cases effusions of fluid have also taken place into the pleural cavities, and even into the pericardium.

247. (c) That the changes in the peritoneum are often an extension of those which had previously taken place in the substance or vessels of the uterus and its appendages cannot be disputed. The phenomena characterizing the progress of the malady; the occasional limitation of these changes to the peritoneum reflected over the pelvic viscera, the uterus and appendages, in some one or more of their constituent structures, being more or less altered; and the frequent extension of the peritoneal changes, as distinctly marked by the symptoms, from the pelvic peritoneum to the reflections of this membrane over the abdominal viscera and diaphragm, demonstrate that the abdominal alterations often commence and advance as now stated. In those cases which originate in a local infection, and even in those where the general infection is followed by a local contamination, it may be reasonably inferred that the morbid irritation and its consequences, thus produced in the internal surface of the uterus, extend along the sexual passages—along the Fallopian tubes to their fibrinated extremities, and thence to the peritoneum, over which it spreads with a rapidity great in proportion to the intensity of the infection, and to the prostration of vital power and resistance.

248. v. *In what manner are the consecutive changes in the joints, cellular and muscular tissues in the eyes and in the viscera, to be explained?*—These consist chiefly of the deposit of puriform matter, in smaller or larger collections, and of infiltrations of this matter in the softened, disorganized, or otherwise altered structure; and are only sometimes observed. That

they are to be referred to the imbibition or absorption of puriform, or ichorous, or putrid matters from the uterus into the circulation, or to the passage of a purulent or ichorous fluid into the blood from irritation or inflammation extending from the sinuses and capillary veins of the uterus and appendages, is generally admitted; either modes of contamination, or both, occurring according to the early states and peculiarities of the case. The morbid matter, having thus passed into the blood, excites and develops a diffusive form of inflammation, with puriform deposits, softening and disorganization of those parts which are most predisposed by previous disorders, by depressing influence, or by impaired vital resistance. These consecutive or secondary purulent collections and destruction of parts have been viewed by some as resulting from the mere deposit of the morbid matter circulating in the blood; while others more correctly consider it as the termination of an asthenic, gangrenous, or destructive form of inflammation produced by the presence of the imbibed contaminating matter in the circulation. This matter, by acting upon the interior surface of the capillaries, produces effects much more disorganizing and diffusive than those resulting from the usual states of inflammation consequent upon external irritation. Although these secondary lesions are most frequently seen after puerperal fevers, and uterine phlebitis occurring in the puerperal state, they supervene in various other circumstances; and as I shall show in the article UTERUS, sometimes upon ulceration of the *os uteri*, and of other parts. This subject is more fully discussed in the articles ABSCESS (§ 24, *et seq.*), ABSORPTION (§ 15, *et seq.*), CELLULAR TISSUE (§ 10, *et seq.*).

249. VII. DIAGNOSIS.—After what has been remarked respecting the forms and states of puerperal fever, and the descriptions of these forms and of the appearances after death, it is unnecessary to do more than briefly to notice this topic. The *diagnosis* of fevers in the puerperal state has, however, been very loosely stated by some writers, and most inaccurately by others; while by nearly all those who have written, with a dogmatism and self-sufficiency which would be ridiculous if they were not most mischievous, and actually destructive of life in the most interesting epoch of female existence, the inflammatory form has been assumed as the type of all the others. Most writers, even the most recent, have described and attempted the diagnosis of puerperal fevers with reference only to the local or prominent affections presented at their commencement or their course, and with entire neglect of the different states of vital power and resistance which characterize their several forms, more especially the synchoïd and malignant. The vital depression, the poisonous contamination, the mental apathy, or, rather, the despondency conjoined with indifference, characterizing the worst cases from their commencement, and the origin of such cases in infectious causes—in foul air, poisonous effluvia, contagious emanations, &c., even of a domestic nature, and which I have fully described at another place (*see PESTILENCE, preservation from*, § 10, *et seq.*)—heightened, favoured, or predisposed to, by the exhaustion consequent upon parturition,

and the state of almost inanition, or of deprivation of requisite nourishment and even of accustomed stimuli in which puerperal females are often kept too strictly or for too long a period—are pathological conditions and etiological circumstances of the greatest importance not only as respects the diagnosis, but even more as regards the indications and the means of cure.

250. A. The *inflammatory form* of the disease, occurring either as *peritoneal*, or *metro-peritoneal*, *puerperal fever*, are indicated by the mode of accession, by the seat of pain and tenderness, by the vascular reaction consequent upon shivering, by the state of the pulse, especially its hardness in the former and its fulness and firmness in the latter; by marked diminution or suppression of the milk and of the lochia; by thirst and dryness of the mouth and tongue; by the often costive state of the bowels at the commencement, and by irregularity afterward, the evacuations being offensive; and by scanty urine, the excretion of it being more or less disordered. Peritonitis, occurring in the puerperal state, presents most of the symptoms described when treating of *inflammations of the Peritoneum*, the disease assuming more or less of a sthenic form on the one hand, or of an asthenic on the other, according as the disease is inflammatory, synchoid, or malignant, the symptoms and lesions found after death very closely approaching, or being identical with, those described under that head, the chief differences arising from the constitutional influence exerted by the puerperal state, by the constitutional infection, or by the exhaustion, or inanition, or other circumstances of the patient.—(a) *Peritoneal puerperal fever* cannot be confounded with *gastro-enteric irritation* (§ 103, *et seq.*), if the abdomen be carefully examined; for in this latter the abdomen is not tympanitic, nor tense, nor very tender on pressure; nor does it usually appear so soon after delivery, nor cause so marked constitutional disturbance as the peritoneal or metro-peritoneal disease.—(b) *Ephemeral fever* cannot be mistaken for any state of inflammatory or synchoid puerperal fever, inasmuch as the former is unattended by the severe abdominal pain, tympanitic distention and tenderness characterizing the latter; and is, moreover, a much less severe disease, of much shorter duration, soon terminating in a copious perspiration, the lochia being uninterrupted, and the breasts continuing distended.

251. B. Puerperal fever, commencing either as *hysteritis* or as *ovaritis*, or affecting chiefly the *ligaments*, and either limited to these, or extending thence, to a greater or less extent, over the peritoneum, whether it assumes an inflammatory or sthenic type, or a synchoid or asthenic, will generally be recognised by the severity of the constitutional symptoms; by the persistence of the local signs, especially the pain, tenderness, fulness, and tension in the hypogastric and iliac regions, shooting through the abdomen to the loins and tops of the thighs; by the rapidity of the pulse, prostration of strength; by the dysuria and irregularity of the bowels; and by the diminution, irregularity, and offensive state of the lochia. If the *peritonæum* continue unaffected, the abdomen will be neither tympanitic, nor tense, nor ten-

der; excepting towards the pelvic regions, where the pain, tenderness, and fulness will be considerable, and the uterus will generally be felt hard and enlarged. The persistence and duration of these symptoms, the grave character of the attendant fever, the disordered states of the secretions and discharges, will distinguish these states of puerperal fever from *after-pains*, from *ephemeral fever*, and from *gastro-intestinal irritation*.

252. C. The *malignant form* of puerperal fever often arises from similar infectious and contaminating sources to those which produce putro-dynamic fever; and it may be considered in every respect a putro-dynamic fever in the puerperal state, presenting all the characters of this fever in an aggravated form. It is distinguished chiefly by the absence of chills or rigours at its accession, by a remarkably rapid, soft, broad, open, and compressible pulse, which soon becomes small, weak, fluent, and irregular; by a broad, flabby, or tremulous tongue, covered by a slimy or cream-like mucus; by the little, or almost entire absence of thirst; by the character of the discharges from the stomach and bowels, as above described (§ 214); by the persistence of the milk and lochia, or the greater abundance and more putrid state of the latter; by the dusky, lurid, or sallow appearance of the general surface and countenance; by the free, clammy, and peculiarly offensive perspiration; by the frequent recurrence of faintness or of a sense of sinking, with moral apathy and vital depression; by the manifest contamination of the circulating fluids and impaired vital cohesion of the tissues; by the quick and peculiar state of perspiration; by the extremely tympanitic distention of the abdomen, and the almost constantly rapid progress of the malady to dissolution, if not early arrested by judicious means; singultus, eructations of flatus, and dark fluids from the stomach, a dirty livid hue of the face and general surface, and loss of the power of and control over the sphincters, ushering in death. After death, the rapid accession of putridity, especially of internal organs, the pelvic particularly, and the little or no diminution of bulk—the almost entire absence of emaciation, notwithstanding the free discharges from the stomach, bowels, and skin during the disease, remarkably attract attention.

253. The malignant form of puerperal fever has been considered by many, especially when the peritoneum is prominently affected, as an *erysipelas* of internal surfaces and organs in the puerperal state; and by others as *typhus* or *typhoid fever*, modified by this state.—(a) The evidence adduced above (§ 151, *et seq.*), and the facts which have fallen under my own observation as early as 1826 and 1827, have convinced me of a connexion between *erysipellatous* and *puerperal fevers*, arising chiefly out of a similarity, if not identity, of their respective predisposing and exciting causes, and of the constitutional—nervous and vascular—conditions existing in their progress, and characterizing their terminations; the connexion being remarkable chiefly as respects the synchoid or intermediate states of puerperal fever, more especially that with prominent affection of the peritoneum. It cannot be said that both maladies are *identical*, for their respective seats are altogether

er different. The connexion or similarity I now point out certainly obtains in a remarkable manner, and is of great importance as respects both the origin and treatment of puerperal fevers. A similar connexion may, however, be traced between several other malignant maladies, arising out of their exciting causes, and their prominent pathological conditions, tendencies, and terminations. A septic or contaminating animal poison, varying in kind, administration, application, and avenue of invasion, is the exciting cause of them all; and, while this cause depresses organic nervous power, contaminates the circulating fluids, loosens the vital cohesion of the tissues, weakens constitutional or vital resistance, and disposes the whole frame to dissolution, it thereby generates miasms, exhalations, and secretions, equally poisonous with itself, and produces effects altogether similar to, if not identical with, those which itself had produced. In this category of effects may be arranged the severer forms of erysipelas, diffusive inflammations of the cellular tissue, poisoned wounds in dissection—the necroscopic poison—puerperal fevers, especially the synchoid and malignant, putro-dynamic fever, and other fevers of a malignant form, which are generally produced by animal emanations or poisons.

254. (b) The opinion as to puerperal fevers being prevailing *typhoid* or *other fevers*, occurring in the puerperal state, may be thus disposed of: 1st. The most malignant form of puerperal fever does not produce typhus or typhoid fevers in other persons, however susceptible they may be, by age and otherwise, of the infection of these fevers, as shown on several occasions both in lying-in institutions and in private practice. 2d. When other fevers, both typhous and exanthematous, occur in the puerperal state, whether the invasion of such fevers have taken place immediately before or very soon after parturition, these diseases retain their distinctive characters, although they are generally much more severe in the puerperal state, as I have observed on various occasions. As respects the exanthemata, the diagnosis requires no remark; but in respect of typhus fever appearing after delivery, a few observations may be here offered.

255. (c) *Typhus* or *typhoid* fever may appear after delivery, from infection either shortly before or soon after this event. And it is not improbable that an adynamic or typhoid fever may occur in the puerperal state, owing to great anxiety of mind, or other moral emotions, or to exposure to various morbid exhalations. When, however, typhoid or adynamic fever occurs during child-bed, it generally assumes a more than usually severe and almost malignant form. The patient complains, after chills or rigours, of severe pain of the head, back, and lower extremities; rapid pulse; dry, hot, and acrid skin; wandering or low delirium, occurring first at night, and becoming permanent, the ideas running upon one subject; deafness, and suffusion of the conjunctivæ; grinding of the teeth, thirst, and dryness of the mouth, the tongue being loaded, brown, or furred, dark, and dry. The position of the patient is on the back, with the knees but little or not at all drawn up. During the delirium the patient gives short ut rational answers when roused. The coun-

tenance is sunk, livid, or sallow; the features are afterward sharpened; and the delirium passes into coma, with subsultus tendinum. The pulse varies from 100 to 120 or 130, and is generally soft and quick; respiration is quick, and accompanied with frequent sighing; the abdomen is not remarkably, or but slightly, tumid or tender; the bowels at first are slow or costive, subsequently irregular or relaxed, the stools being offensive; the urine is scanty and turbid, sometimes suppressed; and the milk and lochia are early diminished, and soon afterward entirely suppressed. At last the patient sinks down in bed; the tongue is dry and dark; the evacuations are involuntary, and without consciousness; and eschars form on the parts most pressed upon. The duration of the fever is generally longer than that of any of the forms of puerperal fever, and is seldom shorter than fourteen days, and is sometimes above twenty-one days. The history of typhoid fever in the puerperal state shows several points of difference from puerperal fevers; indeed, the phenomena just described are distinctions between these fevers, most of them not existing in the latter; and, in addition to these, petechiæ are observed in typhoid, and the measly eruption in true typhus, these never appearing in any of the forms of puerperal fever.

256. VIII. PROGNOSIS.—An opinion of the result of a case of puerperal fever should depend chiefly on the form and state of the disease, in respect both of the character of the constitutional disturbance and the prominent local affection, and on the period of its progress, and the effect produced by treatment.—a. In the *inflammatory form* of the malady, a *favourable issue* may be anticipated from a gradual abatement of the acute symptoms; from a return, or an increase, or a more natural state of the secretions and excretions; from a diminution of the pain, distention, tenderness, and tension of the abdomen; and from a less frequent and more natural state of the pulse. An *unfavourable result* is indicated by the appearance of delirium; of increased distention of the abdomen, which becomes round and very prominent; by an aphthous eruption in the throat; by increased frequency and irregularity of the pulse; by a sudden cessation of pain; or by evidence, by percussion, of copious effusion into the peritoneal cavity; by sinking and sharpening of the features; by continued eructations of flatus with dark fluid matters from the stomach, and singultus; by rapid or gasping respiration; by cold, clammy perspiration, or a similar state of the extremities; by involuntary evacuations and restlessness; these latter phenomena indicating speedy dissolution.

257. b. The *synchoid* or *intermediate grades* of puerperal fever furnish nearly similar phenomena to the above, by which their terminations may be anticipated; for, although the sthenic diathesis obtains at the commencement, or during the early progress of the inflammatory form, still it more and more nearly approaches the synchoid or asthenic, as respects both the constitutional disturbance and the local changes, as the disease continues, especially as it proceeds towards an unfavourable issue, so that an advanced stage of the inflammation differs but little from the same period of the synchoid form, as respects the indica-

tions of the ultimate result. In this latter form of the malady treatment is seldom availing, unless it be early and decidedly prescribed; and unless symptoms of amendment, or, at least, of alleviation, soon follow the remedies employed. If the secretions and discharges have been suppressed, the return of these; an improvement in the states of the pulse and of the abdomen, as ascertained by a careful examination; and the capability of turning or of lying for a time on either side, are the chief indications of a *favourable issue*; and these may not continue long, an exacerbation of all the symptoms sometimes occurring, and soon carrying off the patient; or an alleviation of the more painful symptoms may take place, the pulse still continuing rapid, and after a very few days be followed by secondary affections, as described when treating of the metro-phlebotic state of the malady, which ultimately destroy the patient.

258. An *unfavourable issue* is indicated by the symptoms already mentioned (§ 256), and especially by the character of the vomitings and of the matters thrown up; by singultus and the state of the respiration; by faintness or leipthymia; by failure or irregularity of the pulse; by the amount of effusion in the abdomen, as indicated on percussion, and by the toleration of percussion in connexion with effusion; by the suppression of urine; by the indifference of the patient to her child, and to all other objects; and by an early entertained idea or anticipation of an unfavourable result by the patient herself. Sinking of the animal heat and of the features, and a lurid hue or lividity of the face, extremities, or surface generally, indicate approaching dissolution.

259. *c. The malignant form of the malady* often manifests the result from the accession of the attack, especially in the suddenness and severity of the appearance of the abdominal symptoms. This form of the disease is seldom recovered from, if it continue but a few hours, without the administration of appropriate and energetic means; and, unless these soon procure an alleviation of the symptoms, especially of the vomitings, and of the pain and distention of the abdomen, and an improvement in the pulse, particularly in diminishing its frequency and in improving its tone, hopes of recovery should not be entertained. The symptoms just enumerated usually precede a fatal issue; and that issue may be expected if the lurid, dark, or nearly livid hue of the countenance and surface; the clammy and peculiarly offensive state of the perspiration; the putrid odour of the lochia; the moral apathy, and mental and physical depression appear soon after the attack; inasmuch as these symptoms indicate a contamination of the circulating fluids, and a depression of organic nervous energy which is rapidly removed. A soft or flabby state of the tissues in conjunction with the gastric symptoms described above; a pulso too fast to be accurately counted; loss of power over the sphincters; absence of abdominal pain, the abdomen continuing tumid, with a swagging or tremulous motion when struck or examined, loss of pulse and coldness of the extremities are rapidly followed by death.*

260. IX. PATHOLOGICAL INFERENCES.—(a) *Puerperal fevers* are varied in the character or type of the constitutional disturbance, and in the seat or seats of the prominent local changes.—(b) They present the most inflammatory and the most malignant forms—the most sthenic, or the most asthenic or ataxic, with all intermediate grades, according to the nature of the exciting causes, and the mode of operation or avenue of invasion of these causes—as the local affection is primary or consecutive, and as the constitutional disturbance, with its secondary changes, are the effects of infection by an animal miasm or poison.—(c) Owing to these varied constitutional conditions; to these different grades of vital power and resistance, and

one was attacked before delivery; one in six hours after delivery; one in nine hours; one in ten; three in twelve; one in thirteen; one in fifteen; two in seventeen; one in eighteen; one in twenty; one in twenty-one hours; and two in thirty hours. Thirty-two were attacked on the first day; twenty-nine on the second day; eight on the third; two on the fourth; and one on the eighth day. The attacks were earlier than those observed by me in Queen Charlotte's Lying-in Hospital in 1823, and the seven following years. During that period the majority of the cases were of the most malignant type, and the largest proportion of the attacks were on the second, third, and fourth days. In one most rapidly fatal case the attack was on the fifteenth day from delivery. The statement of Dr. COLLINS, that in only thirty-three cases out of eighty-eight was the accession of the malady attended by shivering, very nearly agrees with my own experience, which also is in accordance with the following: In fifty-six deaths this termination took place at these periods from the attack, viz.: Two in twenty-four hours; one in twenty-seven; one in thirty-six hours; nine on the second day; fifteen on the third day; thirteen on the fourth; four on the fifth; four on the sixth; three on the seventh; two on the eighth; and one on the eleventh day. "Forty-four of the eighty-eight cases occurred in women who had given birth to first children; sixteen with second children; nine with third; six with fourth; seven with fifth; two with seventh; and four with eighth children. Thirty of the forty-four women delivered of first children died. Fifty-four of the eighty-eight gave birth to male children." Dr. COLLINS adds, that "when he was assistant physician in 1823, puerperal fever raged to an alarming extent. The master (physician) of the hospital was a strong advocate for the free removal of blood generally at the commencement of the attack. With his approbation it was resorted to with great frequency, and in the promptest manner. The effect on the patient and the mortality was such as to satisfy him fully of the inexpediency of adopting this line of treatment." It may be remarked in palliation of such adoption, that just before this outbreak of the fever several works had appeared filled with the results of an experience of a few months; duration of this malady, most of them written before the authors were of legal—certainly not of medical age, although distinguished by the title of doctor; which results were dogmatically, and, to my own knowledge of one of these productions, falsely adduced in favour of blood-letting. In the case of this malady, as in that of a somewhat similar pestilence, blood-letting was once extolled as the "sheet anchor" of treatment, especially by the navy wielders of the lancet, who, like DOVER of old, rendered this minute instrument of mighty mischief one of the greatest importance with those who credulously received assertions as facts, and believed all assertions according to the confidence with which they were made. Early in the present century a work appeared on the diseases of intertropical countries, in which blood-letting was the first "sheet anchor," and calomel was the second. In it all preceding writers were ridiculed, and told they knew nothing of what they had written upon, and these remedies were considered so good that patients could hardly have too much of them. This work was the guide of all the inexperienced in tropical diseases, and the results may be inferred from the statement made to me by an inspector of hospitals when I was traveling within the tropics, in answer to my request to know his opinion of the treatment of the fevers of the country, that, for the first nine cases of fever he treated he prescribed blood-letting, relying on the confidently-expressed results of the experience of the author of the work alluded to, and they all died; that he next tried large doses of calomel, but was not more successful; and that he lastly had recourse to cinchona (quinia was not then discovered), but he could not get it to remain on the stomach. I suggested to him that he would succeed better if he conjoined the bark with capsiem. He some time afterward was himself a victim to this fever.

* Dr. COLLINS, formerly the resident physician of the Dublin Lying-in Hospital, states that of eighty-eight cases

diverse complications, the arrangement of the forms of these fevers must necessarily be arbitrary and conventional, inasmuch as each form is not defined by any precise limit or line of demarcation, but passes insensibly into that nearest it in grade or character.—(d) The contaminating or poisonous influences of the causes upon the circulating fluids, and their depressing effects upon organic, nervous, and vital power, affect the states of all the secretions and excretions, and ultimately impair the vital cohesion of the tissues and the tone of the vascular system and of the capillary vessels, thereby occasioning effusions into serous cavities, and increased discharges from exhaling and secreting surfaces, and all the phenomena characterizing the progress of the more malignant forms of this malady.—(e) The most important parts of the pathological conditions of puerperal fever are the states of vital power and of vascular tone characterizing the disease, inasmuch as these states, more than the seat and amount of local lesion, mark the kind and tendency of the malady, and either resist or remarkably favour the extension of the local changes.—(f) According to the mode of operation of the exciting causes, or to the avenue by which these causes invade the frame, either the constitutional infection or the local affection may be primary; but, whichever may be secondary, an aggravation of the primary disorder will be produced by it, the one reacting upon and increasing the other until disorganization and death result, if the procession of morbid actions be not arrested by agents capable of changing the states of vital power and vascular action, and of enabling them to resist farther alterations, as well as to restore those which have already taken place.—(g) A due recognition and estimation of the states of vital power and of vascular action are the basis on which a rational treatment of puerperal fevers should be placed, inasmuch as it is by means of agents affecting these especially that we are enabled to arrest the progress of the malady, and to resist the extension, and even to remove the effects of the local disease.

261. X. TREATMENT.—It is obvious that, in order to be successful, the treatment of puerperal fevers should be appropriately assigned to each of its forms; and that, as these forms are characterized not only by different, or even opposite states of vital power and of vascular action—by very different pathological conditions—so the treatment should be assigned accordingly. Has there appeared in the numerous works on puerperal fevers, or in the still more numerous productions on the diseases of females, either a due estimation of the different forms of these fevers, or a satisfactory exposition of the treatment suited to each form, supposing that the forms and states of these fevers are there duly set forth? Let the reader, who may be supposed to be excited by a desire to know as much as possible of the opinions of those who profess themselves to be experienced by attempting to instruct others—of opinions of the greatest importance to the community respecting, moreover, the most fatal disease known in this country, and that disease attacking only females in the most interesting and most important period of their existence—refer to the works enumerated at the end of this ar-

ticle, and then let him answer not only the above question, but also the following two questions: Have these numerous productions, which have appeared since the latter part of the last century, advanced our knowledge of the pathology and treatment of these fevers in any important particular, or in any way excepting as respects a few subordinate details? Have certain remedial measures, confidently recommended many years ago by physicians possessed of experience, and capable, by ability and education, of observing and of reasoning with, at least, an average degree of accuracy, been satisfactorily tested, or adopted, or at all appropriately employed in those institutions which are most notorious for the generation of these maladies? Leaving these questions to be answered by those whom they may concern, and suppressing those painful and humiliating reflections which the subject suggests to the minds of those even partially informed as to its ethical as well as therapeutical relations, I proceed, *first*, to consider the treatment which my experience has shown me to be most appropriate to the different forms and states of puerperal fever; and, *next*, to notice the several methods and means advised by other writers, and the value which I believe to be attached to them.

262. A. THE INFLAMMATORY FORM OF PUERPERAL FEVER, in its more sthenic manifestations, whether commencing as *puerperal peritonitis*, or *hysteritis*, or as *metro-peritonitis*, requires the prompt and decided antiphlogistic treatment recommended for inflammations of the PERITONEUM (§ 137, *et seq.*) and of the UTERUS, with a due consideration of previous sanguineous losses or exhaustion of the patient, of the state of her constitution, and of the several circumstances and symptoms connected with the case. It should not be overlooked that all cases of these inflammatory states of the disease are not possessed of an equal amount of sthenic diathesis; but that, owing to the nature of the causes, and to the constitution or previous state of the patient, the febrile disturbance as well as the local affection may approach nearer the asthenic than the sthenic condition, and thus the synchoid or intermediate grade of the malady be nearly approached, if not altogether reached. In these states it may be a matter of doubt as to the extent to which vascular depletions, either general or local, ought to be carried; or, if they have been already employed, as to the propriety of repeating them. In these circumstances, and especially in large towns, or in a vitiated atmosphere, less risk will accrue from the rational adoption of other measures; from a due recourse to calomel and opium, conjoined, in the more asthenic cases, with camphor, to terebinthinate embrocations or fomentations, and to the other means recommended for *peritonitis* (see PERITONEUM, § 138–143), than from large or frequent bleedings. When the disease commences in the uterus, in the form either of *hysteritis*, or of *metro-peritonitis*, or in the uterine appendages, as *ovaritis*, too large depletions may only favour the extension of the inflammatory action, unless the *sthenic* diathesis exist, or the patient be not remarkably exhausted by previous losses or inanition. When the local affection assumes an *asthenic* character, the most appropriate treatment is that

which I have advised for the asthenic form of peritonitis (*see art. PERITONEUM*, § 150), and which is equally suited to the other prominent affections appearing in this and in the synchoid forms of the malady.

263. *B. THE SYNCHOID OR INTERMEDIATE FORMS OF PUERPERAL FEVER*, however commencing—in whatever organ or structure, as fully set forth (§ 185, *et seq.*)—require a treatment which should have strict reference to the states of vital power and vascular action; to the predominance of either the sthenic or asthenic diathesis; for, however obvious may be the local seat of mischief, the treatment is not materially or at all different as respects the local affection, especially at an early stage, or until the disease is far advanced. In this form of the disease, especially when commencing with rigours, the early reaction associating the local disease assumes more or less of a sthenic or inflammatory character, which, however, soon passes into the asthenic, especially when the patient breathes a close or impure air, or is morally or physically depressed, or when the veins are more especially affected. In many cases of this form vascular action is often attended by great irritation or excitement, and by an expansive or open state of the pulse, indicating an alteration in the state of the blood both in quality and in quantity—in quantity especially as relates to the capacity of the vascular system, and to the power of adjusting itself to the quantity of blood contained—and in these *vascular depletions* are often injurious, whether general or local; and although, in some instances, a small or a local bleeding may be of service, yet, if it at all pass a very moderate amount, the most irreparable mischief may ensue. In this form of the malady, the inflammatory states of the parts so generally complicating it, if not altogether asthenic at the commencement, soon passes into this condition, especially when the treatment is calculated to lower the powers of vital resistance; and, as vascular depletions not merely possess this property, especially with females confined in lying-in wards, or in the close and impure air of large towns, &c., but also remarkably favour the imbibition and absorption of the discharge retained in the uterus and sexual passages, the occurrence of uterine phlebitis or lymphangitis, and contamination of the circulating fluids, they are most liable to be injurious, and they ought to be most cautiously and moderately prescribed.

264. *a.* A large proportion of the cases of this form of puerperal fever originates in imperfect contraction of the uterus, owing to deficiency of vital power, or to the vital depression more immediately following the impression of the infectious or poisonous cause; the imperfect contractions favouring the retention of an unusually large quantity of lochia within the cavity of the organ and in the vagina, followed by changes in this discharge of a septic and contaminating nature. Thus altered, the lochia not merely affects the surfaces with which it is in contact, but is also imbibed by the vessels, inflaming or irritating them, and altering the blood. With the view of enabling the uterus to throw off the coagula and fluid which may be retained in it, I have advised, in cases where the contraction of the organ after delivery ap-

pears to be weak or imperfect, those remedies which are most calculated to produce or to promote a tonic or contractile action of the womb. With this intention, I have directed the early application of the infant to the breast; and, if the uterus fails to contract sufficiently, an occasional dose of the biborate of soda, or of ergot of rye, or an enema containing spirits of turpentine with asafetida. When, therefore, the disease commences thus locally, the cause is, owing to the circumstances just stated, more or less septic or contaminating, although the vascular reaction may be considerable, when the strength and habit of body of the patient are capable of developing it; and the local effect produced by this cause is generally of a diffusive kind. Admitting that the effect produced locally by this cause, or by any other calculated to occasion it, is of an inflammatory nature, the question still remains, Is the inflammation of a sthenic or asthenic nature, or to what amount may it be supposed possessed of either of these characters? That it is not purely sthenic inflammation of the parts, is shown by the state of the pulse and other constitutional symptoms, and especially by the rapid extension and consequences of the local mischief; and that it is either wholly asthenic, or largely possessed of this property, is proved by the constitutional disturbance, by the rapid diffusion of the local affection, and by the products of such affection. As it has been demonstrated by JOHN HUNTER, and confirmed by all subsequent observers, that asthenic or diffusive inflammations, and inflammations of circulating vessels, are not arrested or even mitigated by general vascular depletions, and hardly even by local depletions, but that they are aggravated in their most distinctive characters and consequences by this treatment, more especially by venesection, it is a matter of the utmost importance that some other than this most abused means should be resorted to. Cases, however, may occur where a nearer approach to sthenic inflammatory action, and a more robust and plethoric state of the patient may warrant a recourse to a moderate depletion; locally in preference, and early in the attack, especially when it is followed by the remedies about to be mentioned; but cautious observation and experience should direct this measure, too often recklessly prescribed by the insufficiently informed, or by the followers of worthless authorities, not a few of which have appeared in recent times.

265. Whether this form of the disease originate in the uterus or uterine vessels, or in the uterine appendages, or in the peritoneum, as shown, both here and in other places, to be probably the case in many instances; or whether it proceed from a constitutional infection received through the avenue of the respiratory organs, the local affection or affections being secondary or contingent, as contended for in respect of other instances (§ 245, *et seq.*), there is certainly no remedy so efficacious as a decided and judicious use of *spirit of turpentine*. This medicine was first employed for this disease by Dr. BRENNAN, of Dublin; and although it has been “damned by faint praise” by subsequent writers, who either have not had recourse to it, or have employed it insufficiently or injudiciously, I can assert that it is the most efficacious remedy that can be employed in this

form of puerperal fever. I state this from a lengthened and diversified experience of this substance in disease; and yet in England I know not of any other physician than myself who has given it a satisfactory trial in puerperal fever, even up to the present day. I state this, in order that the remark may be disproved as regards the knowledge of others, and that I may be enabled to record the fact. The chief hinderances to the employment of this substance are, 1st. A mistaken view of the nature and consequences of its operation; 2d. Its nauseous or unpleasant effects; and, 3d. The opinion that it cannot be retained by the stomach when nausea and vomiting are complained of. As to the *first* of these, I can assert that it is, according to the mode of its exhibition, antiphlogistic in acute inflammations, and more efficacious in arresting the progress and consequences of asthenic or diffusive inflammations than any other substance; while it possesses the property of accommodating, by its tonic and astringent operation, the vascular and capillary system to the state and amount of its contents, of lowering the frequency of the pulse, and of restraining effusion from serous and mucous surfaces. That it is unpleasant, and that it is sometimes thrown off the stomach, I admit; but in many such cases it is beneficial nevertheless, its emetic action, independently of the impression produced by it on a vital organ, occasionally being of service, and even actually required. In those cases where the irritability of the stomach is even the greatest, it not only is the most easily retained, but is actually the most efficient remedy for the removal of the irritability, which, in the opinion of many, is the chief reason against a recourse to it. But the exhibition of it by the mouth is often not the only, and sometimes not the most beneficial way of prescribing it; for it may also be administered in enemata, or applied externally and occasionally, according to the nature of the case, even more efficaciously than in any other mode.

266. Although the spirit of turpentine may be more efficaciously employed in this form of puerperal fever than in the more sthenically inflammatory or in the malignant, still it is a valuable remedy, also, in both these extreme forms; in the inflammatory after sufficient vascular depletions, aided by other means, as described when treating of *inflammation of the PERITONEUM* (§ 141, *et seq.*); and in the malignant, as will be shown hereafter. In this, the intermediate state of the malady, whether commencing locally or with a constitutional infection, this remedy is most beneficial when employed early, or before effusion into serous cavities, or softening or disorganization of the tissues has made much progress. In this, as well as in other forms of the malady, success depends upon a prompt recourse to treatment. If even a few hours elapse from the invasion, changes beyond the reach of remedies may have already supervened. If the symptoms and circumstances of the case, and especially the state of the pulse, indicate the propriety of a small or moderate venesection, or of local depletion, this should be immediately adopted; if the latter mode of depletion be preferred, a number of leeches, varying with the peculiarities of the case, may be applied near the seat of tenderness and pain;

and when they come away, flannels wrung out of hot water, and freely sprinkled with spirits of turpentine, should be applied over the abdomen, and covered by oiled silk or by a napkin; or the spongio-piline may be employed instead of these; and contemporaneously with the application of leeches, a full dose of calomel, camphor, and opium (calomel, gr. v.-viij.; camphor, gr. iii.-vj.; and opium, gr. ij.) ought to be given. A few hours after this medicine has been taken, about half an ounce of spirit of turpentine, and, if the bowels are not freely open, an equal quantity of castor oil should be taken on the surface of an aromatic water, or on spearmint water, or on milk, or in a cup of cold coffee. In most instances the intention is not so much to evacuate the bowels, for they are often sufficiently open, as it is to exhibit a remedy which is calculated, by its passage into the circulation, at least partially to resist the changes taking place in the blood and vascular system generally; and, at the same time, to procure the discharge, both from the bowels and from the uterus, of such morbid matters as would be inevitably most injurious if retained even for a short period. In prosecution of this intention, therefore, an enema containing spirits of turpentine should also be administered some hours afterward; the quantity of this substance, the medicines conjoined with it, and the time of having recourse to it, depending upon the peculiarities of the case. If the bowels are too frequently acted upon, castor oil should not be conjoined with it, either when taken by the mouth, or administered in a clyster; but olive oil may be substituted. Indeed, the latter may be very advantageously given with the spirit of turpentine in almost every state of the disease; for if the bowels should be too relaxed, the compound tincture of camphor or laudanum, or sirup of poppies, may be added; and emollients or demulcents may be made the vehicles for its administration, with olive oil, in enemata. The repetition of these medicines, of the turpentine more especially, the quantity of each, and their combinations, must necessarily depend upon the acumen and experience of the physician, upon the appropriate use of them, and upon the effects produced. But, with their internal employment—by the mouth or in clysters—a recourse to the turpentine embrocations or stupes should be persisted in as long as tenderness, pain, or distention in any part of the abdomen is complained of; and the above dose of turpentine should not be given by the mouth oftener than twice or thrice at the most.

267. If the urinary organs should become affected, either by the quantity of turpentine prescribed, or by its retention by the alimentary canal, the effects will soon disappear if demulcents are freely exhibited; and, if much depression be experienced, either from the operation of this medicine or the state and period of the malady, restoratives, such as quinine with camphor and capsicum, or wine taken in Seltzer water, or opium conjoined with aromatic stimulants, &c., may be administered, according to the state or urgency of the case.

268. *b. Metro-phlebitis* is one of the most frequent complications of this form of puerperal fever, although it is rarely recognised at an early stage. But, if recognised, should the

treatment be different from that now recommended for the arrest of this serious state of the malady? I believe that no other plan of cure will be found more beneficial for it than that now advised; that no other than powerfully restorative, tonic, and soothing means will be found beneficial in this form of phlebitis, or, indeed, in any other form. Dr. R. LEE, who has attached so much importance to metrorrhoea as a pathological condition of puerperal fever, adds nothing to the treatment of this condition, and is even unaware of the means recommended, with great propriety, and often with great success, by JOHN HUNTER in cases of phlebitis. Dr. LEE gives us no farther information on this topic than to profess his want of confidence in the use of mercury for this state of the malady. HUNTER's treatment of phlebitis was powerfully tonic, stimulant, and restorative, and he directed it with the view—correct both in pathology and in therapeutics—of enabling the vessels of the diseased part to throw out lymph capable of coagulation, and of assisting the powers of life, by these or other means, to resist the progress and to retrieve the consequences of the disease. Of the use of oil of turpentine in this malady, Dr. R. LEE entertains a most unjust opinion. I question much the fact of his having given it a satisfactory trial. He distrusts the evidence furnished by Dr. BRENNAN's cases, is not convinced that the lives of those to whom it was administered were saved by it, and says that he has seen many recover without turpentine, in whom the symptoms were more unfavourable than in the cases described by Dr. BRENNAN; and that he has seen other patients in whom the disease appeared to be aggravated by its use. Now it would have been most desirable if Dr. LEE had favoured his readers with an exposition of the treatment which was so fortunate as to restore many cases in which the symptoms were more unfavourable than in those described by Dr. BRENNAN, seeing that in those turpentine had not been used; “sed de non apparentibus et non existentibus eadem est ratio.” Having myself since 1815 prescribed this substance in numerous diseases, malignant, febrile, and inflammatory, and having for many years—since about the above period—employed it in puerperal diseases, I have been induced to make inquiries respecting its use by other physicians; and yet, notwithstanding the notoriety of the practice, and its undoubted success if duly and appropriately prescribed, I have not heard of its having been employed by any other physician in this metropolis besides myself. This is somewhat singular, when the general fatality of the disease, and the highly favourable reports of the practice which have been made by Dr. BRENNAN, Dr. DOUGLAS, and myself, are considered. What are the obstetric practitioners, who appropriate the treatment of puerperal diseases, about? Should the obstetrician cease to be physician, in respect of liberality and candour of sentiment, and of a due appreciation and adoption of remedies recommended by others?

269. Let the opinion given by Dr. DOUGLAS, in an excellent memoir on puerperal fever, be the answer to this question as regards the remedy in question. He states that, in the epidemical and contagious puerperal fever, $\mathfrak{z}\text{ij}$. of the turpentine should be given, with an equal quan-

tity of sirup, and $\mathfrak{z}\text{vj}$. of water, three or four hours after the first dose of calomel; and that after an hour this should be followed by an ounce of castor oil, or some other purgative; or the turpentine and castor oil may be given together; and he restricts the internal use of turpentine to twice only. I have, however, given it even in a larger dose—in half an ounce—thrice in the same case, besides administering it in enemata and externally, with complete success; although I have found one or two doses more generally sufficient. “The external application of turpentine,” he adds, “without either its internal use or the aid of blood-letting, I have frequently experienced to be entirely efficacious in curing puerperal attacks; and although I have hitherto omitted to speak of turpentine for the cure of the other varieties of this disease, yet I should not feel as if I were doing justice to the community if I did not decidedly state that I consider it, when judiciously administered, more generally suitable, and more effectually remedial, than any other medicine yet proposed. I can safely aver, I have seen women recover, apparently by its influence, from an almost hopeless condition, certainly after every hope of recovery under ordinary treatment had been relinquished.” (*Dublin Hosp. Rep.*, vol. iii., p. 157.)

270. Now, without referring to my own experience and authority in the matter, and to the statements of that experience which have appeared in various quarters, I may remark that Dr. BRENNAN's publication was in 1814, and Dr. DOUGLAS's statement, now quoted, was made in 1822; and yet, unless in those cases for which I prescribed this remedy in Queen Charlotte's Lying-in Hospital, I am not acquainted with any sufficient trial which has been made of turpentine in any of the lying-in wards of this city. The eminent senior physician to the General Lying-in Hospital, writing in 1839, remarks as follows: “I have no experience of the use of this remedy (turpentine) introduced by Dr. BRENNAN in 1814, and praised by Dr. DOUGLAS of Dublin, and KINNEIR of Edinburgh, in puerperal fever.”

271. C. THE MALIGNANT OR PUTRO-DYNAMIC FORM OF PUERPERAL FEVER (§ 198, *et seq.*), if not recognised at its commencement, and promptly treated, is always fatal. If even a few hours elapse from its seizure, the changes which have already taken place in the fluids, and even in the vital cohesion of the structures, are rarely arrested in their onward course by any treatment. The means of cure should therefore be early, promptly, and decidedly employed. When thus prescribed they are generally efficacious; at least they proved so in several outbreaks of this form of the malady in Queen Charlotte's Lying-in Hospital, especially when I had the advantage of the assistance of an intelligent resident pupil. In one of the most severe of these epidemics I had the aid of Dr. VOWLES, an intelligent and well-educated young physician, who was constant in his attendance, and who, immediately upon an attack, had recourse to the treatment about to be recommended, varying it according to my directions with the peculiarities of the case and the effects produced by the early part of it. On this occasion almost every case recovered. When I was first called upon to prescribe for

this disease in the hospital, the most malignant form prevailed, and every case that had occurred had terminated fatally. I first had recourse to DOUGLASS'S plan of giving emetics, but it failed, probably owing to my being called at an advanced period of the disease. Having frequently employed the spirit of turpentine in the more malignant states of fever, and being aware of Dr. BRENNAN'S recommendation of it for this malady, I next prescribed this substance, both by the mouth and in enemata, trusting to it principally; but without obtaining from it all the advantages which I had expected. It should, however, be stated, that frequently I was not called to a case until it was far advanced. I was next induced, by my experience of the effects of large doses of calomel and opium in some acute diseases, to try the effects of these; but they still more signally failed. I afterward had recourse to both modes of treatment, and prescribed every four, five, or six hours a large dose of calomel and opium, and the spirit of turpentine with castor oil, the turpentine being employed both internally and externally. From this practice more success accrued than from either of the plans adopted singly. Yet as the success did not equal my wishes, and reflecting upon the phenomena, pathological conditions, and structural changes of the disease, I resolved upon trying the effects of camphor in large doses, in conjunction with calomel and opium, and sometimes with opium alone, or with quinine and capsicum, omitting the calomel, aided by the turpentine, in the manner about to be stated, and upon preceding these by an emetic when its use was indicated by the symptoms.

272. Immediately upon the accession of the disease, or as soon afterward as possible, from ten to twenty grains of calomel, from eight to sixteen grains of camphor, and from one to three grains of opium were administered in the form of bolus, with conserve of roses, the quantities of these medicines thus varying with the apparent severity of the case and the state of the pulse. In some instances, when vital depression was extreme, or the disease farther advanced, the camphor was conjoined with capsicum and opium, and occasionally either with ammonia or with sulphate of quinine, the calomel being omitted. The above were the extreme doses of the camphor, calomel, and opium; and when the largest quantities were given, five or six hours were allowed to elapse before they were repeated. If smaller doses were given, three or four hours only were sometimes allowed to pass. Soon after the second exhibition of these medicines, about half an ounce of spirit of turpentine, with or without castor oil, according to the state of the bowels, was taken as above directed; and a few hours afterward a larger quantity was administered in an enema, with castor oil or with asafetida, and demulcents or enollients, as circumstances suggested. The intention was to make a strong impression on the constitution by means calculated to arrest the morbid action, and to counteract the changes taking place in the blood. Very soon after the development of the abdominal symptoms, especially the pain, distention, and tenderness, several folds of flannel, sufficient to cover the whole abdomen, were directed to be wrung as dry as possible out of hot

water, sprinkled very freely with turpentine, and applied as already described. This application was renewed at intervals, if the progress and symptoms of the case required a recourse to it.

273. In two or three hours after the treatment had advanced thus far—or after one or two of the boluses had been taken, and one dose of the turpentine and an enema administered—the symptoms had generally much abated, if these means had been early employed. In this case the doses of the camphor, calomel, and opium, or of the other combinations of which the bolus was composed, were diminished, and wine also given at the longest intervals above mentioned. The turpentine draught was seldom prescribed oftener than twice, and one only was taken in the twenty-four hours. It sometimes also contained an aromatic spice, as capsicum, &c. If the enema was soon thrown off, another was sometimes administered a few hours afterward, and the fomentation was renewed. If the malady resisted the first or second doses of these substances, the bolus was repeated a third, and sometimes a fourth time after the longer intervals, and in a few instances a third dose of the turpentine was ordered; or the enema containing it was repeated and conjoined with other medicines, according to the state of the bowels. If vital depression was extreme, the turpentine was given in small doses or withdrawn, and capsicum, or carbonate of ammonia, was taken in the bolus instead of the calomel; and a dose of decoction of cinchona, with chlorate of potash, carbonate of soda, and the compound tincture of cinchona or tincture of serpentaria was ordered in the intervals. If the lochia were very offensive, injections containing the solution of chlorinated soda were employed; and the same solution, or a solution of chloride of lime, was used in the wards.

274. If the symptoms evinced marked biliary disturbance or congestion, and the other indications for the exhibition of an emetic were present (§ 278), fifteen grains of ipecacuanha were given immediately and previously to the first dose of calomel, camphor, and opium; and the free operation of the emetic was promoted by the repetition of the same dose in an hour, and by the infusion of chamomile flowers. The emetic generally procured the early evacuation of much altered bile, both by the stomach and by the bowels, and also caused a copious sweat, which the camphor and opium farther promoted, and the terebinthinate embrocations on the abdomen tended to encourage and to perpetuate. But of the use of emetics in these cases I shall take farther notice in the sequel (§ 278).

275. When the above treatment was employed early, or before either effusion into the peritoneal cavity or other structural change had supervened or made any considerable progress, it was generally successful both in preventing or arresting these changes, and in resisting farther alterations of the blood, as well as in removing such as may have already taken place, by increasing the depurating actions of the several excreting organs. The successful employment of the above means required the constant attendance of an intelligent assistant as well as the frequent visits of the physician. During the prevalence of the disease I visited the cases three or four times in the day, direct-

ing the repetition, succession, or modification of the above remedies, according to their effects or to circumstances. If beneficial results did not follow after a very few doses—after the repetitions of the medicines as now stated—or if they did not appear in from twenty-four to forty-eight hours after their first exhibition, the patient rarely recovered. In some extremely malignant cases, for which I did not consider the calomel to be indicated, as well as in others which I did not see sufficiently early, I prescribed camphor in large doses, with capsicum and moderate doses of opium, and sometimes also in conjunction with the sulphate of quinia, which, at the time of the occurrence of these worst cases, was coming into frequent use. In some of these very hopeless cases these means, aided by an occasional dose of turpentine, given either by the mouth or in an enema, and by the external application of this substance, proved almost unexpectedly successful. In others, however, a temporary check only appeared to be given to the disease, the duration of this improvement being seldom longer than a few hours; these cases suggesting the conviction that the changes observed after death had advanced too far to be removed by the agents employed in medical practice. Of the other means which were occasionally tried in this and the preceding varieties of the disease, mention will be made in the sequel.

276. *B. REMARKS ON SEVERAL MEANS OF CURE, &c.*—In many of the works which have appeared on puerperal fevers some particular remedy or method of cure has been recommended, empirically rather than conformably with rational views of the pathology of these diseases; and in most of these the treatment, which seemed, in the eyes of those recommending it, successful to an extent which satisfied their expectations, was lauded as altogether applicable to all appearances of these maladies which may hereafter occur. But while each held forth his own method as most worthy of adoption, other methods, which had been equally praised by equally sanguine predecessors, met with little approbation, if, indeed, they escaped a complete condemnation. It would neither be gracious nor profitable to trace the various differences of opinion as to the treatment of these diseases to their sources; for some of them may be referred to those imperfections of our nature, which medical practice is calculated to develop and to foster when not directed and elevated, in its ethical relations, by the higher and more generous sentiments; while others may appertain to the very different forms of these maladies in different occasions, circumstances, and epidemic constitutions. With no marked disposition to be skeptical on the one hand, or to be credulous on the other; not disposed, with saintly faith, to place much confidence in that which I cannot explain, or to believe in what appears impossible, still I cannot attempt to set limits to the operations of nature, or to the influence of mind and its numerous manifestations on the vital actions. What may appear now as at least improbable may hereafter be found to be entirely in agreement with some principle hitherto concealed from our superficial knowledge. The unknown may seem difficult, complex, unfathomable, and even unattainable, but, once known, it may be easy,

simple, obvious, and within the reach of every intellect. The malady which is found to-day fatal, malignant, and pestilential may be proved to-morrow to be possessed of these properties only in virtue of our ignorance, and of our endeavours to encounter a formidable calamity by complex and ill-understood means; simpler agents, promptly and efficiently applied, accomplishing the ends, with a direct and beautiful simplicity, which were attempted, under the delusions of "false science," by multiplied and inappropriate measures and jarring influences.

277. *a. Vascular depletions and other antiphlogistic measures* were advised for these fevers at an early stage by HULME, KIRKLAND, GORDON, HORN, ARMSTRONG, CAMPBELL, MACINTOSH, and others; and, while some carried these depletions to a great extent, others recommended greater circumspection; while a still greater number of writers prescribed very different or opposite measures. All were equally sincere, and all equally erred; all applied, as true of the genus, what was true only of the species; for, as I have shown above, there are *sthenic* inflammatory, *asthenic* inflammatory, and *malignant* or putrid states or forms of the malady, this last state having no inflammatory attribute whatever, and to each of these different or opposite means are requisite. In the *first* of these, venesection, carried to an amount which can be truly assigned only by the closely observing physician to the peculiar circumstances of each case, is absolutely necessary; in the *second* of these forms, local depletions, by a number of leeches, are only contingently required, and often then with a caution which should never be laid aside; and in the *third*, vascular depletions of any kind are certain agents of destruction. Thus the different forms of the malady, depending upon very different states of vital power, of vascular action, and of constitutional disturbance—upon different pathological conditions—occurring at different periods and in peculiar circumstances, required very dissimilar methods of cure, the method which is quite appropriate to the one form being inappropriate to the others; the great error of writers being their recommendations of what they found most beneficial in their limited sphere of observation, and in the short period of their experience, for all other outbreaks or manifestations of these fevers, without reference to form, character, or epidemic constitution. There is one circumstance connected with the employment of leeches in the more asthenic states of this malady which should always be kept in recollection, namely, the difficulty of arresting the hemorrhage from them, owing to the states of the blood and the impaired tone of the capillaries and tissues. Many years ago, when all cases of this disease, under the delusions created by those who, in the fulness of their ignorance, rushed into reckless print, were treated by bleeding of some kind or other, a large number of leeches were applied over the abdomen of a patient, and, upon these falling off, were followed by a warm fomentation. When this fomentation was looked to after a time, she was found lying dead in a pool of blood. In another case, which occurred in the hospital, leeches were prescribed by one of my colleagues, and the night-nurse who was left to attend to them fell asleep; and although no long period could

have elapsed, the patient was found dead when she awoke. These facts prove not only the risk of copious hemorrhage from leech-bites in certain states of the disease, but also the impropriety of having recourse to them in these states, when even a small loss of blood may occasion fatal sinking.

278. *b. Emetics* had at one time a great reputation in the disease, and have received the commendations of WILLIS, WHITE, DOULCET, BANG, LENTIN, WALSH, LE ROY, HUFELAND, OSIANDER, and DESORMEAUX; while KIRKLAND, HORN, R. LEE, and many others are opposed to the exhibition of them. Ipecacuanha has generally been preferred as the emetic substance, and is certainly most deserving of adoption whenever a trial of this practice may be determined upon, although it may be conjoined with other substances. Among the experienced writers favourable to ipecacuanha emetics, DOULCET is most distinguished. Observing, in 1782, that the disease often commenced with vomiting, he viewed this as an indication of nature, and he assisted her efforts by giving fifteen grains of ipecacuanha, which were repeated the next day. "The patient recovered. This unexpected success led him to try it on all the rest, and two hundred were saved, while six, who refused to take the emetic, died. This treatment, when methodized, consisted in giving fifteen grains of ipecacuanha, repeated in an hour. The last dose acted generally on the bowels, an action which he sustained by a potion, consisting of olei amygdal. ʒij.; sirupi malvae, ʒj.; kermes mineral, gr. j. M.; a table-spoonful of which was taken every two or three hours. He repeated the emetic the next morning if the symptoms were alleviated, and the rather if they were not. If the belly remained meteorized and painful for several days, he looked upon it as a reason for persevering. The previous devastation of the malady, and the consequent despondency in the practitioners of France, caused the news of DOULCET's success to be hailed with enthusiasm throughout the kingdom. The government compensated the discoverer largely. The Faculty of Medicine drew up minute instructions for this mode of treatment, and distributed them gratuitously over the whole of France. On the following year the malady was once more epidemic, and the remedy of DOULCET resorted to in full and earnest faith, but this time it was quite unsuccessful." Dr. FERGUSON, from whose work I have now quoted, justly remarks, that the failure arose from want of discrimination between the varieties of this malady, and from applying in all cases that which is useful only in some. The evidence in favour of emetics is quite as great as that for bleeding or mercury; and it is not supported merely by DOULCET's remarkable success, but by the experience, also, of RICHTER, CRUVEILHIER, TONNELLÉ, and DESORMEAUX. The question is, however, *What are the cases to which this remedy is applicable?* When there are nausea and vomiting on the accession of the disease; when there is bilious vomiting or diarrhœa, with bilious or dusky suffusion of the skin, or signs of congestion of the liver; when the upper regions of the abdomen are the earliest or chief regions affected; when the invasion of the attack is unattended by rigours; and when the disease presents more of the malignant than of the in-

flammatory or synchoïd characters, then the early exhibition of an ipecacuanha emetic has proved most serviceable. On the other hand, when the painful symptoms appeared in the hypogastrium, or when the pain and distress of the abdomen were aggravated by vomiting; when the disease had advanced; and when signs of effusion into the peritoneal cavity had appeared, emetics were manifestly contraindicated, and were not prescribed. In a few of the most malignant cases which I treated, I prescribed, previously to other means, when the patient was seen at the commencement of the seizure, a full dose of sulphate of zinc with powdered capsicum, in order to procure a more immediate operation, and to prevent any contingent depression, which I dreaded from the use of ipecacuanha. This last substance I sometimes gave also thus combined. I remarked, however, that when the ipecacuanha was thus combined, the emetic effect was liable to be prevented by the capsicum, while the operation on the bowels and skin was evidently increased by it.

279. Dr. FERGUSON, in his very instructive work, remarks as follows upon this important part of the treatment of this most dangerous malady: "Besides the examples of the utility of emetics afforded by TONNELLÉ, I have been informed by my friend Dr. R. MAUNOIR, that his father, the celebrated MAUNOIR of Geneva, looks on ipecacuanha as the remedy most to be relied upon in the treatment of puerperal fever—a faith founded on repeated experience in an extensive practice. Among the older authors, WILLIS, WHITE, and A. PETIT were advocates for its employment. In our own times, OSIANDER and HUFELAND in Germany; RECAMIER, CLINET, TONNELLÉ, and DESORMEAUX in France, have all borne their testimony to the signal benefits to be derived from the use of ipecacuanha as an emetic. It would appear that some seasons, or some portions of the year, are more favourable for its exhibition than others. DESORMEAUX first tried emetics in the end of 1828, with great success. During the greater part of the following year they failed; but their use did not aggravate the symptoms. In September, 1829, being cold and humid, they were again given with great benefit. Towards the end of October they lost their power, and in November were totally useless. When it is considered that puerperal fevers are often cured, or alleviated, by copious spontaneous perspiration, or by purging and vomiting, we ought not to wonder at the success of an agent like ipecacuanha, which is capable of producing, and usually does produce, all these effects at once." (*Op. cit.*, p. 210.)

280. *c. Purgatives* have been recommended by HULME, SELLE, WHITE, DENMAN, STOLL, AASKOW, LEAKE, BUTLER, HEY, CHAUSSIER, and others. Dr. FERGUSON states that CEDERSKIÖL, a Swedish physician, tried them extensively, and concluded that the more drastic purgatives are prejudicial. This is also the opinion of BAGLIVI and JOHN CLARKE. The treatment which I have advised above almost precludes the necessity of having recourse to any other purgative medicines than those comprised in the above plan; for the large doses of calomel, sometimes preceded by an emetic, and the subsequent recourse to turpentine and olive or cas-

tor oil, and to enemata containing the same substances, as circumstances may require, are sufficient to answer all intentions as to biliary and fecal evacuations, and to produce at the same time an impression on the economy calculated to arrest the progress of the malady, and to augment the functions of the several enunctories. Dr. FERGUSON justly remarks, that in the wielding of this remedy, as of every other useful one, the disputants have each tacitly assumed the universal similarity of all puerperal fevers—an assumption, I may add, which has been fatal to thousands. His own experience with regard to purgatives is, that whenever they create tormina, there is the greatest risk of an attack of metro-peritonitis succeeding. In order to avoid this, he invariably mixes some anodyne—usually DOVER'S powder, or hyoscyamus, or hop—with the purgative.

231. *d. Mercurials* in various states of combination and modes of administration have been advised for puerperal fevers. Calomel, however, is the preparation generally preferred, and is usually conjoined with opium, as recommended by HAMILTON, and subsequently by WOLFF, HUFELAND, and many others. The inunction of strong mercurial ointment over the abdomen has been suggested by GEBEL and J. DAVIES, who have likewise advised the weaker ointment to be applied over the blistered surface of the belly. But the larger doses of calomel, as I have employed them above, appear to me most deserving of adoption; for it is not so much from the specific action of this medicine that benefit is to be expected, in many cases, as from the operation of it on the biliary organs, and secretions and excretions generally—by its depurating action on the blood, through the medium of the liver and of the other excreting organs. It should not, however, be inferred that calomel or other mercurials are equally beneficial in all the forms of this malady. They, especially calomel, are most serviceable in the inflammatory varieties—in the sthenic after blood-letting, in the asthenic after local depletions, or after an emetic. In the malignant form of the malady, calomel was most serviceable at an early stage, conjoined with stimulants and opium, and was employed chiefly with the view of increasing the actions of the liver and other enunctories. It was often followed by powerful tonics and restoratives. If the large doses of calomel failed early in the disease, they were seldom of any advantage at an advanced stage, although this substance was given subsequently in smaller quantities. When the bowels are irritable, Dr. FERGUSON recommends the abdomen to be kept constantly covered with the linimentum hydragryi compositum. He agrees with Sir B. BROWNE in considering the bi-chloride of mercury to be preferable when the disease is presumed to be connected with uterine phlebitis; and in this complication the bi-chloride may be conjoined with camphor and opium, or taken in a decoction of cinchona, as I have given it in several analogous pathological conditions.

232. *c. Opium* has long possessed considerable reputation in the treatment of puerperal fevers and peritoneal inflammations. (See art. PERITONEUM, § 150-153.) For the former, it has been much confided in by GEBEL, HOLLST, HORN, MICHAELIS, BATES, &c.; for the latter,

by HAMILTON, ARMSTRONG, GRAVES, STOKES, BATES, and others. It has been variously combined with other medicines for these states of disease—with calomel, or with antimonials, or JAMES'S powder, or with ipecacuanha, or with musk, or with camphor, or with valerian, or with capsicum, &c., according to the views of the physician and circumstances of the case. The influence of opium in these maladies has been very justly estimated by Dr. WATSON, who truly remarks: "Of the great value of this remedy in certain cases, and after sufficient blood-letting (in the treatment of inflammation), I have long been satisfied. I presume its beneficial operation is to be explained by its known power of tranquillizing disturbed and uneasy nerves. Mere nervous irritation appears sometimes to keep alive or to rekindle inflammation, which depletion of the blood-vessels had almost or for a time extinguished; and opium, given in a full dose, will often prevent this renewal of disturbance in the vascular system, by quieting the nervous irritability. I am, indeed, persuaded that opium is, of itself, equal to the cure of some forms of inflammatory disease in which bleeding would be improper, the disorder of the capillary vessels subsiding spontaneously as soon as the teased and teasing condition of the nervous system is allayed. Accordingly, the opiate treatment has been found the most effectual in persons who possess by nature, or who have acquired through disease or intemperance, undue irritability of frame. It is especially useful, also, whenever local inflammation is attended by much bodily pain, which in all persons is a source of irritation." It is most satisfactory to me to find my views, as to the pathology and treatment of INFLAMMATION (§ 7-9 and 206), in accordance with those of so able and discriminating a physician as Dr. WATSON.

233. Mr. BATES, of Sudbury, confides chiefly in opium for the treatment of puerperal inflammations and fevers. According to *one plan*, which appears to be directed against the more inflammatory states of disease, he directs bleeding from the arm to about a pint, except there be great exhaustion; and an opiate enema, consisting of ℥j. to ℥ij. of tinctura opii in ℥xij. decocti amyli calefacti, to be repeated in twelve hours if there be no return of pain, and whenever there is a renewal of the symptoms. The patient is allowed only barley water or thin gruel, cold, and in small quantity. When the bowels are confined, and after the pain and sickness are removed, and the abdominal tenderness somewhat abated by the foregoing means, he prescribes the following clyster: ℞. Vini aloes, ℥ij.; magnesiae sulphatis, ℥j. ad ℥ij.; olei olivæ, ℥j.; aquæ calidæ, ℥xij. Misce. He farther directs bottles of warm water to the feet; fomentations and linimentum saponis cum opio to the abdomen; and leeches when great tenderness is present. According to *another plan*, the following bolus is to be taken as soon as possible, and repeated in an hour, and then to be continued every two hours until the pain has ceased. Ease ensues, he says, from the administration of the fifth to that of the tenth bolus; if not, he resorts to the enemata. ℞. Pulveris opii, pulveris acaciæ, pulveris antimonialis, aa, gr. j.; confectio-nis rosæ caninæ, q. s. Misce. Fiat Bolus.

284. *f. Stimulant, restorative, and even tonic remedies* have been recommended by several writers, and are more or less serviceable in the more malignant states and far-advanced stages of the disease. I have very often had recourse to them, and almost always in conjunction with opium. The substances belonging to this category which I have most frequently prescribed are camphor, as directed above, capsicum, ammonia, and sulphate of quinine. Musk and valerian have likewise been advised, but commonly conjoined with opium, by HORN, MICHAELIS, and others. The ammoniated tincture of valerian I have found of service in some instances, variously conjoined with tincture of opium and other medicines, according to the peculiarities of the case. These stimulants and tonics are efficacious in the more malignant states of the disease only when given early, in full, large, or frequent doses of opium, in large doses, and aided by the turpentine, as prescribed above (§ 266); and after the second or third dose I have not found any benefit derived from calomel in these states of the disease, when repeated more frequently.

285. *g. Of other internal remedies* recommended for this malady but little notice is required. *Calumba* has been preferred by some writers when a tonic is required; and *alkalies* have been employed by BARKER and ALLAN. *Borax* has been given by BREFELD, BANG, and myself; and it is certainly of use under certain circumstances, especially in promoting the contractions of the uterus, and the discharge of coagula or retained matters from this organ; and thereby removing a cause of the disease, or an obvious source of aggravation and contamination. BOER attributed his success in the treatment of an epidemic appearance of this malady to his use of an antimonial preparation, which was without doubt the well-known JAMES's powder, which, when conjoined with opium, or with camphor and opium, is certainly extremely beneficial, and when prescribed after vascular depletions, in the inflammatory states of the malady, or when given from the commencement in the synchoid or intermediate form, so as to produce copious diaphoresis.

286. *h. Of clysters, or enemata*, it is unnecessary to add any thing to what I have already stated. The medicines which are most beneficial, when thus administered, are the spirit of turpentine, olive oil, castor oil, opium, camphor, asafetida, &c., according to the form and stage of the disease.

287. *i. Injections into the vagina*, and even into the cavity of the uterus, have been recommended by several physicians, and by the author when the lochia is acrid, excoriating, and offensive. COLLINGWOOD, SCHMIDTMANN, DANCE, and TOXNELLÉ have advised frequent injections of warm water only, or chiefly. I have seen benefit derived from the addition of a small quantity of one of the chlorides, or of creasote, to the fluid when the discharge was manifestly offensive. MICHAELIS directed vaginal injections, consisting of an infusion of valerian and linseed, and they were probably of service in washing away the morbid discharge, and in soothing the irritation of the sexual passages produced by it, the chief intentions which these means are calculated to accomplish.

288. *k. It is hardly necessary to notice any*

other external means of cure besides those already mentioned. General warm baths and hip-baths have been directed by several writers; but there are several difficulties placed in the way of them; and in many of the most severe cases they are either of doubtful or of no advantage. Still they ought not to be entirely overlooked in the more inflammatory states of the malady after depletions, and occasionally in other circumstances, which will suggest a recourse to them, but which hardly admit of description. The application of a large blister to the abdomen has received the approbation of GOODWIN, MICHAELIS, HUFELAND, and J. DAVIES, and is certainly deserving of adoption in several states of the disease; although a more immediate and decided advantage is derived from the turpentine stupes mentioned above (§ 266), especially when early and perseveringly employed. If these cease to be of service, or are insufficient, or inappropriate to certain advanced states of the more prolonged cases, a blister will occasionally be of use. [There are some striking cases on record, where cold water applied to the abdomen has been remarkably efficacious in the treatment of the disease. Although no friend to the indiscriminate use of water as a remedial agent, we believe, nevertheless, that it is, when judiciously applied, a most powerful remedy, and well worthy of trial in this affection.]

289. *C. PROPHYLACTIC MEASURES*.—I have already noticed certain topics connected with the prevention of puerperal diseases generally (§ 43, *et seq.*); but there are others more especially relating to the prevention of puerperal fevers that require a very brief notice. Prophylactic measures relate, 1st. To the management of the female during and subsequently to parturition; and, 2d. To the prevention of foul and contaminated air in the ward or apartment in which she is confined, and to the destruction and counteraction of these and all other infectious and contagious agents.—(a) As to the former of these, it is unnecessary to state more than that an officious interference with the parturient process, violent measures used to hasten it, or the neglect of means to promote it, when the efforts of nature are either insufficient or exhausted, the admission of a foul and contaminated air to the generative organs after parturition, or the retention of such an air or of foul exhalations in the vicinity of these organs, and neglect of due measures of cleanliness and of the frequent removal of the discharge, are calculated to cause or to favour an attack of this malady, and, consequently, that a careful avoidance of these causes should always be observed.

290. I quite agree with Dr. R. LEE that the administration of acid cathartics soon after delivery should be avoided, and that the greatest care ought to be taken in performing the requisite operations of midwifery. The hand ought not to be passed into the cavity of the womb unless with the greatest gentleness, when the introduction of it is quite indispensable; and portions of the placenta should be prevented from remaining to become decomposed within the uterus. "It is impossible to condemn too strongly the practice recommended by Dr. Gooch, in cases of flooding after the expulsion of the placenta, of passing the hand into the uterus for the purpose of compressing the part

where the placenta was attached, and from which the blood is flowing." (*Op. cit.*, p. 113.)

291. (b) *The prevention of infection or contagion* in respect of puerperal fevers can be accomplished only by the adoption of those measures which I described when treating of Infection (see § 55, *et seq.*), and by the avoidance of those causes (§ 41, *et seq.*) which are productive of these fevers, as well as of those sources of contamination described when treating of the prevention of Pestilence. The measures recommended in that article are especially applicable to the prevention of and protection from outbreaks of puerperal fevers in lying-in wards; and for the purification of these and other chambers, and of the bed-clothes and bedding on the occasions of these outbreaks. To that article I must, therefore, refer the reader, and more particularly to what I have stated at § 77, and when treating of the "*Domestic Sources of Pestilence.*"

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PULSE.—*Pulsus*.—Σφύγμος. *Pouls*, Fr. *Puls*, Germ.

CLASSIF.—GENERAL PATHOLOGY.—SEMEIOLOGY.

1. The arterial pulse is produced by the blood thrown into the aorta by each contraction of the left ventricle. There are three elements which contribute to the production of this phenomenon: 1st. The arterial tubes or vessels which manifest it to the touch; 2d. The blood, or contents of these tubes, which, upon receiving the impulse from the heart, affect the condition of the arteries; and, 3d. The heart itself, which originates the impulse transmitted through the blood to the vessel, and by the vessel to the touch. According to the conditions of these three elements or constituents of the pulse—the arteries, the blood, and the heart—and to the various combinations which they may severally produce, will the pulse vary in disease, and even in health, although within a much more confined range. These three constituents of the pulse require an individual and particular consideration in estimating the states of the pulse, or, rather, as the causes of these states, and in connecting these states with functional and organic changes—with the manifestations of vital power and action.

2. I. HISTORICAL NOTICES AS TO THE PULSE.—Little mention is made of the pulse by HIPPOCRATES; and CELSUS notices it chiefly to record his opinion as to its fallacies. GALEN may be justly viewed as the first who attempted to investigate the pathological relations of the pulse, and he did this at great length. An abridgment of his treatises on this subject has been made and published by ANDRÆA LACUNA. As far back, probably, as the days of GALEN, if not even farther, the Chinese had published treatises on the pulse; and by means of their acquaintance with it, and by it chiefly, they pretended to a knowledge of all diseases. The importance attached to the pulse by GALEN, and by all the writers on medicine in Eastern countries, in ancient times, appears to have been such as to have given rise to the greatest charlatanry and pretence in the practice of medicine. It was supposed in those times, and down to the present day in these countries, that the pulse furnished all the information which the physician required, both as to the seat and as to the nature of a disease; and it was not until past the middle of the seventeenth century that attempts were made by BELLINI to

investigate the subject with some reference to scientific principles; the researches and discoveries of HARVEY having opened paths by which the ruins of ancient opinion might be removed, and laid foundations for permanent structures. The publication of Sir J. FLOYER's "pulse watch," in 1707, first imparted precision to our estimation of the pulse; and various conditions of it, possessing much importance in practice, especially as being sources of prognosis, were pointed out by SOLANO in 1731, and more clearly illustrated by NIELL in 1745, in his "New and extraordinary Observations concerning the Prediction of Crisis by the Pulse." The subject was farther pursued by FOUQUET and BORDEU about the middle of the last century in France, and towards the close of that century by HEBERDEN and FALCONER in this country; these latter divesting the subject of much of the inanities and puerilities which had become connected with it since the days of GALLEN. Although these writers had thrown aside much of the encumbrances under which sound observation was more or less concealed, still correct views as to the states of the pulse were very far from being entertained. Nor could such views be exhibited while the morbid conditions—functional and organic—of the heart itself, the prime factor of the pulse, remained hardly or very imperfectly known.

3. II. PHYSIOLOGICAL PATHOLOGY OF THE PULSE.—Before the various states of the pulse can be duly considered, some notice must be taken of the conditions of each of the *three constituents* of the arterial pulse—of the *arteries*, of the *blood*, and of the *heart*.—A. THE ARTERIES, as I have shown in other places (*see articles IRRITABILITY and SYMPATHY*), are not inert tubes, but living vessels endowed with certain *vital* as well as *physical* properties.—a. Their *physical properties* are chiefly expansibility, extensibility, and elasticity: *expansibility* in the expansion of their diameters or enlargement of their calibres; *extensibility* in their elongation to a certain extent during muscular movements, and other causes; and *elasticity*, or the recovery of their natural states immediately upon the removal of the expanding and elongating causes. These properties are possessed by arteries in a very eminent degree, and in virtue of their conformation—of their fibrous coats, and of their serous and dense cellular and connecting tunics. They are evinced to a great extent after death; but they exist to a greater extent during life, vitality not only endowing these vessels with peculiar properties, but also increasing their physical qualities.

4. b. *The vital properties of arteries*, and which contribute very remarkably to form the character of the pulse, depend especially upon the organic or ganglial nerves, which not only accompany all the arterial trunks and ramifications, but form reticula around them, and are lost in their fibrous and serous coats; the states of organic nervous energy affecting the vital conditions of these vessels. These conditions or properties are referable to different states of one vital endowment, viz., *tone or tonicity*. According to the state of vital tone will the arteries manifest a greater or less degree of *expansion* or of *constriction*, both when subjected to the sense of sight and when examined by the sense of touch. The *expansion* and the *constriction* are

states of vital tone, or different states of vitality manifested by the arterial system, through the medium or influence of the organic or ganglial nervous system supplying it, and are easily made apparent by means of various agents; as, by plunging the hand in warm water, a certain increase of the vital expansion of the arterial vessels will follow, and the vessel will become full and broad; and by plunging the hand in cold water, the artery will become small and more constricted. In an excellent lecture by Dr. C. J. B. WILLIAMS (*Lond. Med. Gazette*, vol. xxi., p. 594), he observes, that he repeatedly observed the aorta of an ass recently killed contract very remarkably when plunged in cold water; while the pulmonary artery did not contract so much. The vital conditions of the arterial system vary remarkably: 1st. With the states of vital energy of the whole frame—with the states of constitutional power; 2d. With the influence of agents acting externally or internally on the vessels, the operation of agents varying according as they are thus external or internal; 3d. With the conditions of the capillary and venous circulations, and with the freedom from obstacle to the onward transmission of blood circulating through the arteries.

5. (a) When *constitutional or vital power is unimpaired*, the arterial pulse then presents a state of healthy or natural tone, modified somewhat with the peculiarity of constitution or the amount of vital energy. In these cases the pulse evinces neither broadness, nor expansion, nor softness, nor weakness, on the one hand, nor undue constriction, hardness, or smallness on the other. It is then possessed only of moderate firmness and fullness, its frequency or number in a given period depending upon the action of the heart. When vital power is *reduced*, and in proportion to the reduction, is the tone of the artery weaker and rendered soft, compressible, and otherwise changed according to the states of the blood and heart's action (*see § 6, et seq.*). When, on the other hand, the vital energy is *excited*, the state of the vessel is then firm, round, or hard, and otherwise altered with the action of the heart, and the quantity and quality of the blood. Marked modifications in the state of the arteries result from agents influencing the conditions of the organic nervous system; but these agents frequently also co-ordinately affect the heart—both the arteries and the heart; whether these agents affect this part of the nervous system *primarily* and *externally* to the arteries and heart, or *secondarily* and *internally* to the vascular system, by imbibition and absorption, or through the medium of the blood; the state of the arterial vessels being, in either case, thereby more or less changed, according to the nature of, and the influence exerted by, these agents. The natural conformation of the arterial system is sometimes different in different individuals, some persons possessing a more powerfully constituted state of this system than others, especially in respect of the fibrous coat, the vessels thereby acquiring increased tone, and often a greater degree of hardness or firmness, both in health and in states of excited action.

6. B. THE BLOOD is another necessary constituent of the pulse; the uninterrupted column of blood, extending from the commencement

of the aorta to the part of the artery to which the finger is applied when feeling the pulse, being essential to the sensation communicated by the artery to the organ of touch. It is presumed, in our examinations of the pulse, that the states of this column of blood are the same throughout the arterial system, the difference being only as respects the diameter and length of the column, according to the artery which is felt. This, however, is not always the case, as slight modifications will occasionally follow from local determinations, influenced by the state of nervous power, and from local impediments or obstructions to the venous or capillary circulation of a part. But without reference to these modifications, we shall find sufficient sources of alterations of the pulse in the *conditions of the blood circulating through the arterial system*. The conditions of the blood which affect the pulse are, 1st. *Quantity*; 2d. *Quality*, or alterations in its physical and sensible conditions, and probably also in its *vital states*.

7. *a.* Adverting first to *quantity*, it is obvious that any deviation from that quantity which is adapted to the capacity of the vascular system generally will affect, in a very sensible manner, the arterial pulse, as respects both the states of the arteries and the contractions of the heart. When there is a *due correspondence* between the capacity of the vascular system and the quantity of blood circulating in this system, the coats of the arteries will be kept in that state of healthy tension, or tone, favourable to a regular, firm, free, natural, or healthy pulse, varying chiefly in frequency with the state of the heart's action, which will depend upon either exciting or depressing causes.—(a) When the quantity of blood in the system is *excessive*, more or less of oppression may be evinced in the state of the artery, as well as either of increased or of diminished frequency, much of these changes arising from existing states of vital excitement or depression. Excessive fullness of blood, however, may exist, and, being attended by congestion of one of the minor circulations—of the lungs, of the liver, or of the sinuses of the cerebro-spinal axis—may not materially affect the pulse. But as this state will not long continue without evincing its connexion with either depression or reaction of vital power, so will the pulse, through the medium of the heart's action, be slow or frequent, as well as oppressed; the degree of frequency depending on the heart's contractions, and these contractions depending upon the state of the organic nervous or vital influence, and other causes, to be noticed hereafter. The sensation produced by an artery in cases of excessive vascular fullness I have designated that of oppression, the vessel feeling as if it were kept in a state of tension, or of distention, in the intervals between the beats; and, if the pulse be at the same time much accelerated, an idea suggests itself that the heart is excited by the load, and, by its more frequent contractions, is endeavouring to disembarass itself and the vascular system generally; while if, with this state of the artery, the pulse is slow, the notion presents itself that the organic nervous energy actuating the heart is insufficient for the amount of blood circulating through the frame. Under these circumstances, it is found that the abstraction of blood renders the pulse more free,

less tense or oppressed, and more natural, while it diminishes the acceleration in the former circumstances, and increases it in the latter.

8. (b) *Deficiency of blood* is attended by a very different state of the arterial pulse; the frequency of it depending, as in all other cases, upon the cardiac action, and the tone of the vessel very much upon the state of vital power. When the blood is very deficient in quantity, the state of the pulse will depend much upon the power of the vessel, and of the vascular system generally, to accommodate themselves to that deficiency. If the vital or the organic nervous power is not depressed to a very low state, the vessels will evince merely less fullness, or become more constricted or smaller, yet, at the same time, soft or compressible. If vital power is excited or irritated, notwithstanding the loss of blood, the vessel imparts, with great frequency, much quickness, or suddenness of impulse against the finger, and greater constriction. If it be extremely depressed, the pulse may be either rapid or slow, according to the irritability of the heart, but the vessel feels very soft or compressible, the slightest pressure obstructing its canal, while the impulse communicated to the column of blood in the artery is quick or rapid when the heart's action is excited, the vessel feeling as if it were nearly empty between each impulse, and is slow, undulating, and weak when the contractions of the left ventricle are much weakened, and irritability exhausted. Much, however, of the changes in the states of the pulse, with alterations in the *quantity* of blood in the body, is owing not only to the associated state of cardiac action, but also to the *quality*; to the constitution and states of the blood, physically, sensibly, and vitally.

9. *b.* The *quality of the blood*, as well as the quantity, has been shown in various parts of this work (see ART. BLOOD, DISEASE, FEVER, PESTILENCE, &c.) to be remarkably changed in its sensible appearances, and in its vital states. I have in several places attempted to show that the blood, in addition either to excess or deficiency in its quantity, may have either an excess or deficiency of its red globules, or of its fibrin, or of any other of its constituents; and that it may, moreover, abound in morbid or in foreign matters, owing either to imbibition and absorption, or to imperfect depuration and excretion. Still there are manifestly additional morbid states of this fluid which also affect the pulse, although these cannot be accurately estimated in grade or kind: these are the vital conditions of the blood, derived from the vessels and body generally, through which this fluid circulates. That there is a very intimate relation and even connexion between the vital conditions of the vascular system and the constitution of the blood, especially of its globules and liquor sanguinis, cannot be doubted; and although the vital states of the blood are derived from or dependant upon those of the vascular system, still they react upon this system, especially if they continue for any time, or are not removed by the efforts of the constitution, or by the aids of medicine.

10. During the progress or continuance of changes in the sensible qualities and vital states of the blood, especially as evinced in the course of rheumatic, inflammatory, or of adynamic,

malignant, and pestilential maladies, the pulse can only imperfectly manifest such changes, which usually commence in the nervous and vascular systems, although most apparent in the blood. In cases of *vascular excitement*, in inflammations, in acute rheumatism, &c., the fibrin of the blood is abundant, and the vital crasis of the coagulum is firm or even increased, and these states may continue after repeated blood-lettings, showing that these changes of the blood proceed from vascular excitement or reaction rather than that the changes in the blood cause the vascular reaction; the condition of the blood being the effect, not the cause of the state of the pulse, which is always more or less quick, sharp, and rapid, owing to the increased irritability and irritation of the heart. When, with this state of vascular excitement, there is also vascular fulness, then the pulse will feel full and hard, as well as sharp, quick, or rapid; but if the vascular excitement continues, or is fed by irritation or pain, or by the state of organic nervous sensibility and energy, after the vascular system is depleted, or after large losses of blood, then the pulse will become sharp, constricted, rapid, and of various grades of tone or strength, according to the nature and seat of the disease, as observed in acute rheumatism, &c.

11. In cases of *depressed vital power*, or when the organic nervous energy and vascular action are more or less weakened, as well as otherwise altered, as in the course of malignant, pestilential, or specific maladies, the fibrin of the blood is diminished, the constitution of the hæmato-globuline is altered, and the crasis of the blood remarkably impaired. In these circumstances the pulse is affected, and the experienced and close observer may even predicate from the state of the pulse the character of the changes proceeding in the blood, although he may not infer their exact amount; but according to their nature and extent—in proportion to the loss of vital power and of the crasis of the blood—will the pulse become open, broad, soft, weak, and compressible, the artery suggesting to the mind of the examiner ideas of defective or lost tone, of impaired elasticity, and of relaxation. But with these changes in the vessel others are associated, depending upon the amount of blood and the state of the heart's action. If the blood be abundant in quantity, in proportion to that abundance will the pulse be full as well as broad and soft. The artery will furnish a sensation of largeness, and feel full and broad, but still soft between each impulse communicated by the contraction of the ventricle, the parietes of the vessel feeling as if they yielded to the impulse, especially if the heart's action be excited. If, on the other hand, the amount of blood be deficient, the pulse is not only soft, weak, relaxed, or open, and very compressible, but the vessel feels to the examiner as if it were nearly empty between each wave of fluid undulating through it, the impulse of each wave being quick or sudden while the heart's action continues excited, but weak, or languid, or slow as the irritability of the heart becomes exhausted. The action of the heart will be noticed hereafter; but it may now be stated that, in these as well as in many other circumstances, to it belong those changes in the number of the pulse in a given time with

the qualities of quickness, sharpness, or suddenness of the impulse of the column of blood against the parietes of the vessel where it is pressed upon by the finger, or with the opposite qualities of languor, weakness, smallness, &c., according to the excited, or weakened, or nearly exhausted irritability of this organ.

12. C. The HEART furnishes, besides *frequency*, several other qualities, as already noticed, to the pulse. The influence of the heart on the pulse is, 1st. *Functional*, or dependant upon the strength or weakness of the contractions of the organ, and upon the grades of irritability possessed by it; and, 2d. *Structural*, or owing to lesions in the parietes of the cavities, or in the valves or orifices of the heart.—a. The *functional influence* of the heart on the pulse varies with different diseases, as these diseases are characterized by excited or increased organic nervous energy and vital power, and increased irritability of muscular and contractile parts on the one hand, or by impaired or exhausted power and irritability on the other. The heart being, by nervous supply from the ganglial and cerebro-spinal nervous systems, and by muscular structure and vascular connexions, intimately associated with all the vital functions, is not only influenced by these functions, but also influences them. But whatever may be the state of the heart's action, thus influenced and influencing, the *frequency* and the character of the *impulse* communicated to the column of blood in the artery is produced by the contractions of the left ventricle. When the actions of the heart are unimpaired in tone or in strength, if the irritability of its structure is unexhausted, the frequency of the pulse is seldom very great, although the excitement may be very considerable. In strongly constituted persons the pulse seldom rises above 100 in a minute, even during inflammations; and it is only as the excitement or irritation becomes associated with diminution of vital power—this latter always gradually supervening upon, and increasing with the continuance of excitement or irritation—that the pulse becomes very frequent, or much above 100. In delicate, susceptible, or nervous females especially, the pulse is often very rapid during nervous excitement; or in various febrile or inflammatory diseases, or in states of irritation; but in them power is deficient, and although the irritability of the heart is readily excited, it is the more rapidly exhausted.

13. But frequency of pulse may be occasioned not only by nervous excitement, by increased irritability, or by febrile or inflammatory action, but also by losses of blood, and by the want of due correspondence between the quantity of blood and the capacity of the vascular system in general. It is difficult, however, to determine whether or not the increased frequency be caused by this want of correspondence, and the efforts made to compensate for deficient quantity by accelerated motion, or by augmented excitability consequent upon the loss of blood. Most probably this latter effect is that which is immediately caused by this loss; the former effect, or the compensating influence of accelerated motion, being the result of exalted excitability. But the acceleration of the heart's contractions caused by losses of blood has always a more or less obvious relation to the

amount of such loss, and to the conditions of the blood which remains. If the quantity lost be very great, the irritability of the heart soon becomes exhausted, even although the morbid state of the remaining blood, or other sources of irritation, may tend to excite and to prolong the irritability of this organ. This is evinced by various diseases for which large vascular depletions are ordered, and by acute or active hemorrhages, &c. At the commencement of the former of these, while the vascular system is full, vital energy excited, and the blood uncontaminated, or at least not very materially altered, the pulse is full, firm, or strong, and not remarkably frequent, the contractions of the heart being energetic, without abruptness or quickness. After a considerable loss of blood the pulse becomes soft, the impulse of the column of blood against the wall of the artery pressed on by the finger much more frequent and more abrupt, and the vessel is felt more empty in the interval between each impulse. The contractions of the ventricles are more frequent and sudden, because the excitability of the organ is at first increased, probably, not only in consequence of the loss of power, but, also, owing to the state of the blood supplied to the structure of the heart itself. If still more blood be lost, the constitution of the remaining blood is more or less altered, the pulse becomes more accelerated, more abrupt and quick, softer, smaller, or more compressible; the contractions of the heart more numerous and abrupt, but much less energetic; and if the patient be not aided, or if still more blood is abstracted, the action of the heart becomes weaker and weaker; in some cases so frequent as not to be counted; in others as remarkably slow, according to the states of the remaining blood, and of the organic and cerebro-spinal systems, by which the vital properties of muscular structures, irritability, and excitability are developed and influenced.

14. A somewhat similar procession of changes in the pulse follows acute hemorrhages. During the vascular excitement often preceding the loss of blood the pulse is very full, more or less frequent, and often bounding, the impulse of the column of blood against the walls of the vessel apparently exciting a reaction, or developing the elastic property of the artery. In this case the contraction of the ventricle, and the consequent momentum transmitted to the column of blood, is so great or energetic as partially to overcome the vital tonicity of the artery, and to manifest the resiliency of its walls; hence the bounding or hemorrhagic pulse. But as soon as blood is lost, particularly if the quantity be large, the pulse becomes still more frequent, quicker, or more abrupt, much softer and opener, the vessel feeling more empty, or, at least, much more compressible in the intervals between the abrupt or sudden pulsation. If the hemorrhage be still progressive, and excessive or fatal, the pulse will present changes similar to those just mentioned, modified, however, by constitution, by the seat of hemorrhage, and by the diversified circumstances affecting the patient externally and internally. In many cases, however, commencing in the acute manner described, a moderate loss of blood, by relieving the vascular system of a load too great for the tonicity of the vessels, and by lowering the in-

creased action of the heart, restores this system and the pulse to their natural states, and, with such restoration, a cessation of the hemorrhage results.

15. *b.* The influence of *lesions of the heart* upon the pulse is necessarily remarkable. But the changes in the pulse which these produce belong to the diseases of the membranes, the valves, the orifices, and the structure of this organ. (*See art. HEART.*) These changes consist of intermissions, irregularities, smallness, weakness, remarkable slowness, and numerous other states of the pulse, which, however, can never be duly estimated without a close examination of the sounds and impulses of the heart simultaneously with a similar examination of the pulse, and a comparison of the phenomena furnished both by the heart and by the artery. Many of the states of the pulse caused by structural lesions of the heart may also proceed from nervous and functional disorder; impaired nervous power of the organ, with or without other functional changes affecting the state of the heart or large vessels, so disordering the actions of the ventricles as to produce intermissions, irregularity, inequality, remarkable frequency or slowness, or smallness, &c., which soon disappear as nervous power is restored, or the functional disorder is removed. A pulse may present intermissions, although the heart contracts during the intermission, the contraction being only too weak to communicate a momentum to the column of blood sufficient to be felt by the examiner, or the quantity of blood thrown out by the ventricle being too small to produce any manifest change in the column of blood in the artery.

16. III. SENEIOLOGICAL NOTICES OF THE PULSE. —Having considered the *principles* on which our knowledge of the pulse is based, and with due reference to the principal conditions of the three *constituents*, or elements of the pulse, it may be useful to take a brief view of those states of the pulse which attend, and hence indicate certain morbid actions, and their several seats. In the view which has just been taken of the elementary principles of the pulse, it has been shown that changes in the vital manifestations of the frame—in the organic nervous energy, in the irritability or excitability of living fibres, and in the quantity and quality of the blood—remarkably and co-ordinately affect the tone of the vessels and the contractions of the ventricle; and that, while an alteration may originate in any one of the three constituents of the pulse, and affect it chiefly for a time, it will not long exist thus limited, but will implicate more or less the others. Changes commencing in the blood will affect both the tonicity of the vessels and the actions of the heart, and generally co-ordinately in grade and in kind. Changes, moreover, originating in the organic nervous system will necessarily extend themselves not only to the heart, but also to the arteries, as it is this system which supplies and actuates both heart and arteries, and ultimately to the blood and structures generally; and the alterations thus superinduced in the blood will react upon both the heart and arteries. Hence, in the course of disease, the pulse becomes a more or less accurate index of the vital conditions of the heart, of the vascular system generally, and even of the blood; the indications

furnished by it being accurate, according to the powers of the physician to interpret them correctly, the want of accuracy depending more upon the observer than the object of observation. The pulse varies in *diseases*, and even slightly in *health*, as to its *development* and *rhythm*.

17. i. The *DEVELOPMENT* of the pulse differs in different cases, and in different stages of the same case, in *force*, *consistence* or *tone*, and in *volume*; and according to these differences, and to the various combinations of these, the following states of the pulse occur, without reference to frequency or rhythm: 1st. Hard, resistant, tense, firm, or sthenic. 2d. Contracted, constricted, or concentrated, and small. 3d. Full, large, broad, ample, or open, and bounding, rebounding, &c. 4th. Soft, compressible, empty, weak, feeble, unequal, small, &c. 5th. Precipitate, quick, rapid, sudden, vibratory, &c. 6th. Languid, undulatory, &c. Several of these terms are, however, nearly synonymous, and convey the same, or very nearly the same idea. —ii. The *RHYTHM* of the pulse, in its various grades, is *superadded* to any of the above, and differs remarkably in frequency, regularity, and inequality, or intermittence.

18. A. A *hard, resistant, tense, firm, or sthenic pulse* are terms applied by writers to convey nearly the same notion, and are met with, attended by more or less *acceleration* of the pulse, in young, robust persons of the sthenic diathesis and muscular habit, and irritable temperament, during the early stage of reaction in inflammatory fevers, in inflammations of serous membranes, in acute rheumatism, in inflammations of the membranes of the brain, in the hot stage of intermittents, and in eccentric hypertrophy of the heart, and when the arterial system is strongly developed. They always indicate the sthenic diathesis, and excited power and action, and admit of large vascular depletions.

19. B. A *contracted, constricted, concentrated, and small and hard pulse* are various terms applied to the same state, and are intended to convey an idea of that pulse which is met with in some cases of the diseases just mentioned, especially when there is less fulness of blood, and which is usually attended with greater acceleration of the heart's contractions, and indicates a more violent and less favourable disease. This state of the pulse, as well as the foregoing, seldom continues long without passing into some one of those about to be noticed; and it more especially indicates the supervention of structural lesion, and a dangerous issue if not promptly or actively treated, especially by moderate and early depletion, diaphoretics, relaxants, and derivatives.

20. C. A *full, large, ample, broad, open, bounding, or rebounding pulse* are states not altogether identical, but very nearly approaching each other. They are met with in various diseases. —a. In inflammatory fevers, especially at an advancing stage or after a moderate depletion. —b. During inflammations of mucous, cellular, and parenchymatous structures. —c. In inflammations of serous membranes after the preceding states of the pulse have been removed by large blood-lettings. —d. Preceding and accompanying hemorrhages, the pulse being also much accelerated when the hemorrhage is abundant, and when inflammations have been treated by copious blood-lettings. The pulse is fre-

quently then open and compressible, rather than full, and often passes into the two next states to be noticed. A full, large, or broad pulse is often observed in inflammations of the structure of the lungs, and of the substance of the liver, with various grades of acceleration. It is generally met with in young, plethoric persons, and in the sanguine temperament, also in the serofulous and hemorrhagic diathesis. It indicates a less degree of tolerance of blood-letting than the preceding states; and if it assumes an open, bounding, and, at the same time, a compressible quality, blood-letting should be prescribed with great circumspection.

21. D. A *small, soft, compressible, feeble, empty, and unequal pulse* are modified conditions, which severally indicate important states both of the vital power and of the blood. *Smallness* is generally dependant upon diminished quantity of blood, or an afflux of the fluid to a quarter remote from that where the pulse is felt. *Softness* and *compressibility* indicate defective tone and vital power. *Feebleness* is merely an advanced state of the same qualities, showing still greater depression of power, especially of the heart; and a feeling of *emptiness* in the vessel suggests the same condition, and a deficiency of blood in addition. *Inequality* of the tone, or strength, or fulness of the pulse usually attends, as well as the other qualities just instanced, diseases characterized by debility, or a far-advanced stage of acute maladies; and in these several circumstances it presents certain modifications. The strength, tone, and fulness of the pulse may differ in different parts of the body; and this is not uncommon in the course of various nervous diseases. It generally occurs also in connexion with local congestions and determinations, and in various states of exhaustion and of the blood. The inequality may exist as regards the character of the pulse in the same vessel, and it may then present a modified form in different diseases. It may be unequal, inasmuch as it varies in strength and fulness for three, or four, or five beats in an ascending scale, or in a descending scale returning for two, or three, or more pulsations to a natural standard, or to a more constant rate or grade. This state of the pulse is often met with in the advanced course of diseases of the abdominal viscera, when inflammations of serous surfaces terminate in effusion, after hemorrhages or during convalescence from them; and it is generally attended by a varying rhythm, or by different degrees of acceleration.

22. E. A *precipitate, rapid, quick, sharp, sudden, vibrating pulse* should not be viewed as indicative of increased frequency. These terms, which are expressive of the same, or nearly the same quality, have reference merely to the character of the impulse of the column of blood in the vessel against the finger, and, as the impulses are thus brief, the intervals between them are more distinct, or even prolonged, when the pulse is not accelerated, which, however, it generally is more or less when it presents this character. These states of the pulse are caused by the rapid or precipitate contractions of the ventricle, and are indicative of morbidly excited irritability in connexion with deficient power, and often also with more or less anæmia. It is met with in chlorosis, in anæmia, in diseases of debility characterized by increased

susceptibility and excitability, in the advanced stages of acute diseases, especially after copious hemorrhages and blood-lettings, and in the advanced progress of fever, and when the blood is either contaminated or deficient. When there is no deficiency of blood the pulse may, at the same time, be full, large, or open, or even bounding (§ 20), but it usually is also soft or compressible, indicating the defective vital power which attends it. More or less frequency is also present, especially in the advanced stages of acute diseases, when the acceleration is generally very great, and great in proportion to the exhaustion of vital power. This combination of quickness or precipitancy with extreme frequency is characteristic of the operation of contaminating poisons, of poisoned wounds, of malignant puerperal and other fevers, and of that state of morbid action which surgeons have called irritative fever, and which is owing to excessive irritation in connexion with depressed vital power, and often also with a poisoned or contaminated state of the blood. It suggests active means of a powerfully restorative nature, and diametrically opposite to vascular depletions; and yet I have seen these latter insisted upon, and even employed to the rapid destruction of the patient, the quickness and great acceleration of the pulse having been misunderstood from a culpable ignorance of the states of the pulse, and of the indications furnished by a true interpretation of them.

23. *F.* A languid and undulating pulse occurs in the course of diseases characterized by exhausted vital power, especially in melancholic temperaments and leucophlegmatic habits of the body. When the pulse is merely languid, a weak and protracted contraction of the ventricle may be inferred, owing either to exhausted or to weakened excitability, or to visceral congestion. If the pulse be also small, deficiency of blood generally also exists, and this is still more likely to be the case if the pulse assumes an undulating character. Languid and undulating states may coexist with various grades of frequency, but the latter is most manifest when the pulse ranges below, or but little above 100 or 110 in a minute.

24. *ii.* The Рhythm, or frequency of the pulse, differs both in health and in disease.—*A.* In HEALTH it varies with the age, sex, and the temperament and diathesis of the individual.—*a.* As to age, the pulse usually ranges from 120 to 130 soon after birth; and it is generally somewhat more frequent, or from 130 to 150, during the early course of dentition, or from three to six or seven months. After six or seven months, the pulse becomes less frequent with the advance of age, so that at about two years of age and up to four it varies from 115 to 110, and from four to ten it ranges from 110 to 90 or 80. After puberty, and during middle age, the pulse varies in different persons from 60 to 80 in a minute; and, as old age advances, the pulse generally falls to 50 or 60, or ranges between these numbers; numerous exceptions, however, occurring, and even instances of an increased frequency sometimes being met with.

25. *b.* Sex has some influence on the frequency of the pulse. In males the pulse in health varies from 60 to 75, with the position of the body, &c., from 65 to 70 or 72 being the most common grade of acceleration. In females the pulse

usually ranges from 70 to 80 or 85, and it is also more excitable, particularly upon mental emotions, especially in early age, a similar excitability being also often observed in males about the age of puberty or soon after. The most common range in females in good health is from 72 to 80; but the pulse is usually more frequent and more developed during pregnancy.

26. *c.* The temperament and diathesis affect the pulse in a slight degree even in health and in repose, as the pulsations are somewhat more frequent in the nervous, the irritable, and sanguine than in the melancholic, bilious, or leucophlegmatic or lymphatic temperaments, and the action of the heart is more excitable in the former than in the latter, and in the scrofulous than in the rheumatic diathesis. Habit of body also affects the pulse more or less; but much depends upon the actual fullness of the vascular system; for if plethora exist, the pulse may be a little slower than the usual rate, especially in a state of repose; and if the blood be somewhat deficient in quantity the pulse may be much accelerated, and very excitable. In all our investigations of the pulse, not only the above causes of variation in frequency should be recollected, but others also of not less influence, as the position of the body, and the states of sleeping and waking.

27. *d.* The position of the body varies the frequency of the pulse more or less; but, according to my own observation, in no definite grade, the effect in health, and still more manifestly in acute and febrile diseases, differing in amount with different individuals, in some cases in a very remarkable degree, and in others very slightly. The recumbent position generally reduces the pulse somewhat below the standard of health, as observed in the sitting posture; while the standing posture raises the pulse above this standard even more than the recumbent depresses it. As to any scale of depression in the one posture and of exaltation in the other, it is impossible to determine with satisfactory accuracy, as the variation, which is wide in different cases, and even in the same case at different times, depends most probably upon several causes besides those already adverted to, and it is not more easy to assign the causes than to determine the exact amount of variation. The complete repose of the body and absence of muscular exertion during the recumbent position may be supposed likely to leave the heart also in a state of quietude; but probably other circumstances favour this state of the circulation. The slight retardation or embarrassment of the respiratory movements, when a person lies on either side, the position of the heart with reference to itself and its large vessels, and to that of the trunk and the contained viscera, the disposition to congestion of the lung of the side on which the person lies, and the state of the circulation within the cranium, seem to me severally to combine to slightly retard the circulation in the recumbent position. In the sitting posture these causes are removed, and with them the retardation of the pulse, while the heart is in a position the most favourable for its action. That the standing posture should accelerate the pulse may be inferred, although to a less amount than is often observed, from the circumstances of this posture admitting not only of a free circulation,

but also favouring it by the slight degree of muscular action required to sustain this position. It also favours the full exercise of the respiratory functions, which will also influence the circulation more or less.

28. *c. Sleeping and waking* favour different states of frequency of the pulse. During *sleep* the pulse becomes slower than in the sitting posture, and even sinks below what the recumbent posture generally manifests, and it is at the same time softer. The influence of sleep in reducing the frequency and tone of the pulse is most remarkable in nervous and irritable persons, in females, and in early age, in whom the pulse often then becomes unequal. *Dreaming*, however, often excites the pulse much above the healthy standard; so that the individual may awaken up remarkably excited with palpitations, flushings, or with pallor, and a rapid, small, or weak pulse, according to the nature of the dream—as the dream occasions fear, anxiety, depression, or anger, &c.

29. During the *waking hours*, the pulse is liable to be remarkably affected, not only by the emotions of mind, but also by the impressions made on the senses, according to the various states of excitability of the heart. The influence produced on the pulse in the *course of the day* is not very remarkable, as so many causes of deviation are apt to occur, and affect the individual more or less—the external or physical influences to which he is exposed, the emotions of mind, the *ingesta* and *egesta*, and the states and stages of digestion and assimilation. It was stated by Dr. KNOX that the pulse is more frequent soon after waking in the *morning*; but Dr. CHRISTISON has shown that the heart is only more excitable in the morning, the pulse continuing nearly the same throughout the day, all things being equal; but much depends upon the nature of the food, even in the absence of all stimuli.

30. *B. DISEASE* furnishes the widest range in the *rhythm* of the pulse, and the greatest deviations from the healthy condition. The *morbid pulse* may range from twenty or thirty to two hundred, or even more, beats during the minute; but neither of these extremes can be looked upon as being compatible with a probable, or even with a possible recovery, or with the continuance of life for any time.—*a.* Remarkable *slowness of the pulse* may be caused by pressure on the brain, especially near its base and the medulla oblongata, or by intense vital shock; but the more extreme states of slowness most frequently depend upon structural or vital lesions of the heart itself. A more than usually slow pulse may, however, be constitutional, or be met with in health. I have thus found the pulse range from 50 to 60 in a minute; and a pulse from 55 to 60 is not infrequent in bilious, melancholic, and leucophlegmatic temperaments and diatheses; and it is sometimes hereditary. Great slowness of the pulse occasionally is observed on the invasion of acute diseases, particularly periodic and continued fevers, and shortly before death from malignant fevers, from some acute maladies, and from diseases of the brain, or of the heart itself, especially when vital power is either suddenly or violently depressed, or remarkably exhausted by previous inordinate excitement.

31. *b.* It is often difficult to determine the

degree of acceleration of the pulse which should be viewed as morbid; for nervous, weak, susceptible females, and the irritable and sanguine temperaments in this sex, sometimes present, in states of very slight mental excitement, or even soon after a full meal, a very considerable acceleration of pulse, and yet preserve their usual good health; and these temperaments, in this sex particularly, are often attended by the greatest frequency of pulse during acute diseases, more especially when these diseases occur during the puerperal state. A pulse ranging above 110, in a person older than twenty-five years, of the male sex, and not of the nervous or irritable temperament, is not without risk, the amount of which will depend on concomitant circumstances. If it rise to 120, or above this, the danger is great, unless in nervous and susceptible temperaments, and in females. In this sex, especially the nervous, the hysterical, irritable, or delicate, the pulse may range as high as 130 without any risk; but this will depend much upon the nature of the disorder, upon its seat, and upon other circumstances.

32. The frequency of the pulse is seldom very great in the early stage of acute diseases, while vital power is unimpaired, as of inflammations, fevers, &c., unless in the class of patients just mentioned. It is chiefly when these diseases have gone on to the exhaustion of vital power, or to the contamination of the blood, and in this class of females, and in the puerperal state, that the pulse rises above 120; and at that amount or frequency, and more especially if the number is increased, it behooves the physician to be cautious as to his prognosis, and as to the treatment he may adopt; for, unless the pulse be also firm, or full, or hard, or at least not deficient in tone, venesection, particularly if it be large, may aggravate the disease, remarkably increase the frequency of the pulse, and even endanger the patient. Great acceleration of the pulse, as above 110, should be viewed as militating against, rather than in favour of, vascular depletions, unless in small quantity, or locally. If, however, this frequency be attended by fulness, hardness, or firmness, vascular depletions, to an amount which concomitant states and symptoms will regulate, may be prescribed, especially when serous surfaces are affected. When the acceleration amounts to 110 or 120 and upward, and when it is attended by a very soft or compressible, precipitate, small, feeble, or languid state of the pulse (see § 8, *et seq.*), then restorative measures, rather than depletory or depressant, are required, and required with an urgency proportionate to the greatness of the acceleration and the want of power or of tone in the vessel, and other concomitant symptoms.

33. *c. Inequality or irregularity of frequency of pulse*, as well as of fulness and power, is often observed, especially in persons far advanced in life. It is sometimes met with in *children* when asleep, even when in health. It occurs in diseases of the heart, in affections of the liver, in those of the brain, and not infrequently in the maladies of the puerperal state. When, with this inequality, the pulse is small, weak, or precipitate also, or when the inequality is very great, then a serious or even dangerous state may be inferred. LEROY says (*Du Prog-*

nostic dans les Maladies Aiguës, § I., ch. i.), that when this state of the pulse is accompanied with hemorrhage, or with bilious vomiting or purging, a favourable crisis may take place.

34. *Irregularity*, or marked inequality, of the pulse is not infrequent in the puerperal states, especially at the accession and in the advanced progress of puerperal fevers, and should be viewed as indicative of great danger, especially if the pulse is at the same time very rapid, broad, precipitate, or undulating. In these cases, as well as in the advanced stage of malignant fevers, this state of the pulse is generally connected with failure of vital power and an altered condition of the blood.

35. The pulse is necessarily always of the same frequency in different parts of the body; but it varies often in strength, fulness, and tone in opposite or remote parts. In hemiplegia the pulse is often weaker, smaller, and softer in the paralyzed side, and in paraplegia in the lower extremities. In cases of local determinations of blood, and in susceptible and nervous persons, the pulse varies in fulness, volume, and strength in different parts, according as the local irritation and vital power may determine an increased flow of blood, and thereby disturb the natural equilibrium of the circulation and distribution of the blood.

36. *d. An intermitting pulse* is not uncommon in every period of life, and in different diseases. It is rarely observed in children, unless when they are the subjects of rheumatic endocarditis or pericarditis, or of the more dangerous states of disease of the brain. It is in rare instances also observed in children when they are asleep, but not so often as inequality and slowness of pulse. An intermitting pulse is much more common in aged persons, and common in proportion to advanced age. At this period of life it is often caused by organic change; but it is sometimes, although not so frequently, the result of impaired organic nervous energy, and is connected with dyspepsia, or with flatulence or torpor of the liver. In these latter circumstances, however, the intermissions are not so frequent nor so complete as in cases of organic lesion, and the pulsations between the intermissions are more equal. At all periods of life, functional intermissions of the pulse may occur, although most frequently in advanced age, in the dyspeptic, the flatulent, and the sedentary; and in these it is generally irregular, or after various numbers of regular pulsations, and is caused by impaired organic nervous power, and by flatulence either pressing on the diaphragm, or rising in the œsophagus, and embarrassing the dilata-tions of the auricles and ventricles. In many instances, however, of these intermissions the ventricle does not altogether fail to contract; it only contracts too weakly, or throws out an insufficient quantity of blood to occasion the usual impulse of the column of blood in the vessel on the finger (§ 8, et seq.). In these cases, therefore, the heart should always be examined by percussion and by the ear, in order to ascertain the state of contraction of the left ventricle, and to ascertain the cause of the intermission, and its dependance upon functional disorder, or upon organic lesion, as well as the nature of that lesion as far as this may be inferred. When the intermission is complete,

is frequent, and depends upon organic lesions, the danger is greater and more imminent than when the intermission is merely incomplete, and caused by impaired vital power, unless, indeed, at a far-advanced stage of low or malignant fevers, or in acute diseases attended with effusion into shut cavities. Our opinions, however, as to the indications furnished by intermissions of the pulse, should depend much upon the nature and history of the diseases in which they are observed, and upon the character of the pulse and of the sounds of the heart's contractions between the intermissions. An intermitting pulse, in connexion with great frequency or even with remarkable slowness, with a small, weak, languid, or undulating state of the vessel, occurring in hemorrhagic diseases, or at an advanced period of fevers, especially when they are attended by hemorrhages, is generally a fatal indication.

37. It is unnecessary in this place to consider at greater length the several irregularities of the pulse, as they are noticed more appropriately when treating of those diseases in which they are most apt to occur. Nor will my limits admit of any notice of the influence of diverse stimuli, or of various depressants on the pulse. I may, however, simply mention, that the remarkable influence of the exciting emotions of the mind on the one hand, and of the depressing emotions on the other, upon the frequency and character or development of the pulse, should never be overlooked; that the nature of the usual food and beverages of the patient is also important, especially when either has been partaken of shortly, or even for some time before the pulse is examined; and that great frequency of pulse, especially when caused by exhaustion and vital depression, will often be reduced most remarkably by suitable stimuli and restoratives, even although the skin may be hot, if other symptoms do not decidedly contraindicate them. The effects of various energetic agents on the pulse will be seen by referring to the symptoms produced by poisons. (*Sec. art. POISONS.*)

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PURPURA.—SYNON. Πορφύρα, Galen. *Purpura*, Riverius. *Petechiæ sine febre*, Auct. Var. *Scorbutus*. *Hæmorrhæa petechialis*, Adair. *Phanigmus petechialis*, Sauvages. *Porphyræ*, Good. *Morbus maculosus hæmorrhagicus*; *Morbus maculosus Werlhoffii*, *Purpura hæmorrhagica*; *Purpura sine febre*; *Miliaria rubra*, Auct. *Pourpre*, Fr. *Der Purpur*; *das Purpur friesel*, Germ. *The Purples*.

CLASSIF.—3d Class, Sanguineous Diseases.
4th Order, Cachexies (Good). 3d Order,
5th Genus (Bateman). CLASS IV., ORDER
IV. (Author).

1. DEFINIT.—i. NOSOLOG.—*The occurrence of small, distinct, purple specks or patches in the cutaneous surface, attended by languor, general debility, sometimes by pains in the limbs, and always by evidence of disorder of the digestive, the assimilating, and excreting functions.*

2. ii. PATHOLOG.—*Depressed organic nervous energy giving rise to impaired tone of the capillaries, especially of the mucous and cutaneous surfaces, and to diminished crasis of the blood, thereby permitting the passive exudation of this fluid.*

3. This disease is intimately related to the hemorrhages on the one hand, and to scurvy on the other, being intermediate between them, or forming the link which connects them, certain cases hardly admitting of any distinction between them and hemorrhage from mucous surfaces, and others being almost identical with scurvy. *Purpura* usually appears independently of fever, with a number of reddish, purplish, or livid spots, of various sizes, on the cutaneous surface, these spots being usually termed *petechiæ*, *vibices*, and *ecchymoses*, according to their sizes; and in the severer cases it is attended by hemorrhage from one or more surfaces, but chiefly from the mucous surfaces. The spots or patches are rarely elevated above the surrounding level of the skin, are not attended by any uneasy sensation, and, when examined closely, they are found to consist of exudations of blood between the layers of the dermis, or in the subjacent cellular tissue, or,

rather, of serum coloured by the red globules variously altered. They cannot be viewed as an eruption, or rash, but are strictly a passive hemorrhage of the vascular tissue of the skin.

4. Several acute diseases present, in their advanced stages, when organic nervous or vital power is exhausted, and the crasis of the blood diminished, or its constitution contaminated, or otherwise changed, this state of cutaneous hemorrhagic exudation, in the form of petechiæ, vibices, ecchymoses, &c., and they have hence been denominated petechial fevers, or febris petechialis, or febris purpurata; and in these fevers hemorrhages from some mucous surface is very apt to supervene. These changes of the capillary vessels and blood, manifesting themselves more especially and visibly on the cutaneous and mucous surfaces, are not infrequent in low and asthenic fevers, both simply continued and exanthematic, and were more common formerly when a heating regimen, insufficient purging, and ventilation were generally employed. But in these fevers the petechiæ and purple spots are merely symptomatic—are consequent upon a series of changes produced by the fever, while they constitute one of the chief phenomena of the disease under consideration, although attended by others, and often followed by several of most serious import, the former being a continued or exanthematic fever with petechiæ or purpura, the latter a *purpura sine febre*, or *purpura non-febrilis*.

5. RIVERIUS first distinguished purpura from the petechiæ sometimes symptomatic of the typhoid, adynamic, or malignant states of fever; and WERLHOFF long afterward briefly described it. STRACK next noticed it, and was followed by BEHRENS and GRAFF; and, almost contemporaneously with these last, by DUNCAN, SEN., ADAIR, and FERRIS. Soon afterward TATERSALL, WALKER, WILLAN, BATEMAN, BERENGER, ACREL, PIERQUIN, BRACHET, and others referred to in the BIBLIOGRAPHY, treated of purpura as an idiopathic malady. WILLAN considered the disease as nearly identical with scurvy; but this opinion was shown to be untenable by PARRY and HARTY, although an intimate connexion cannot be disputed; and the alliance is certainly closer than these last writers have endeavoured to show.

6. Writers have generally divided the disease into certain varieties, respecting which they have not been quite agreed. WILLAN and BATEMAN have designated the *Purpura simplex*, *P. hæmorrhagica*, *P. urticans*, *P. senilis*, and *P. contagiosa*. RAYER has recognised the *simplex*, the *hæmorrhagica*, and the *senilis*, to which he has added the *febrilis*. BIETT considers that the first and second of these varieties only deserve notice, and that the others are rare occurrences, or are symptoms belonging to other maladies. While GOLDIE retains only the first, second, and third varieties of BATEMAN'S arrangement, WILSON has divided the varieties of purpura into *simplex*, *hæmorrhagica*, *urticans*, *senilis*, *cachectica*, and *febrilis*.

7. The exudation of blood in minute spots, or in larger patches, from the capillary vessels of the integuments, constituting either petechiæ or ecchymoses, takes place in the superficial layer of the dermis, or beneath the epidermis, especially when it forms merely petechiæ; and in the cells of the corion, or even in the subcu-

taneous cellular tissue, particularly when it appears in the form of vibices or ecchymoses. The colour of the spots varies with the quantity of red globules in the effused serum, with the quantity of blood, and with the time elapsed from the exudation. At first the *petechiæ* are usually a dark-red, and successively purple, livid, and reddish-brown. As they are absorbed, or farther changed, they become yellow, and at last disappear as pale-yellow stains. The *ecchymoses* are not only larger than the *petechiæ*, but are of a purplish or darker hue from the first, the exudation of blood being greater, and they become by degrees successively blackish, reddish-brown, greenish-yellow, and yellowish, until they entirely disappear. The spots, whatever may be their size, are of a deeper or darker colour in the centres than in the circumferences, which latter pass into the hue of the surrounding skin.

8. I. DESCRIPTION.—VAR. i.—PURPURA SIMPLEX.—SYNON. *Petechiæ sine febre*, Auct. *Phanigmus petechialis*, Sauvages. *Porphyra simplex*, Good. *Pétéchies sans fièvre*, Fr. *Rothe punkt*, Germ. *Petechial scurvy*; *Simple purpura*.—This variety, like all the others, although less remarkably than they, is preceded by more or less constitutional disorder. The patient has complained, and even still more complains, of languor, loss of muscular power, of weakness of the joints and pains in the limbs, increased on slight exertion. The complexion becomes pale and sallow; the pulse is weak, soft, and excitable; the tongue is loaded, and its edges often marked by the impressions of the teeth; the bowels are confined, the stools offensive, and the urine loaded, or thick upon cooling. The appetite is impaired, and sometimes there are nausea and headache. The *petechiæ* and small *ecchymoses* usually attending and characterizing this variety may affect the surface either partially or more or less generally. When partial, they are limited chiefly to the lower extremities, or affect also the upper; but very frequently they are numerous on the insides of both the lower and upper extremities, and on the breast, neck, and abdomen. They vary in size from a minute point to that of a pea, are rounded, do not disappear on pressure, and are not attended by itching, nor other uneasy sensation. They may be either simultaneous in their appearance, or nearly so, or successive; in the former case, the tints they assume may differ little; in the latter, the hues of each point or spot vary more or less with their respective durations. The face is often free from them; but if they appear there they are usually observed also in the conjunctivæ, and in the mucous membrane of the mouth and fauces. Their duration varies, as they are simultaneous or successive in their appearance, being usually two or three weeks in the former case to as many months in the latter. When this variety is neglected it may pass into the next.

9. VAR. ii.—PURPURA HÆMORRHAGICA.—SYNON. *Hæmorrhagia universalis*, Wolf. *Morbus maculosus Werthoffii*, *Morbus maculosus hæmorrhagicus*; *Porphyra hæmorrhagica*, Good. *Pourpre*, *Hæmorrhagic pétéchiâle*, Fr. *Land scurvy*.—This variety is often preceded for some weeks by great lassitude, and by the constitutional symptoms now enumerated (§ 8), but in a more marked degree. In some instances it occurs

much more suddenly. It is always, however, accompanied with extreme debility and depression of spirits; by marked disorder of the digestive, assimilating, and depurating functions; by morbid states of the evacuations; by a feeble, soft, compressible, and excitable pulse; by slight chills alternating with flushings or perspiration; by pallor, or sallowness, or duskiness of the skin; and by a loaded, flabby tongue, and spongy state of the gums. In some instances the hypochondria are distended; syncope or faintness is complained of; or the extremities swell when in a depending position. The breath is fetid, and the odour of the body is offensive. Pains in the limbs, or about the præcordia, back, or abdomen are not infrequent. The pulse may be slow, or of natural frequency, but it is readily excited. More or less emaciation is commonly observed.

10. The *petechiæ*, in this variety, are interspersed with *ecchymoses* and vibices, sometimes with livid stripes or patches, resembling the marks left by bruises. They commonly appear first on the legs, and, at varying periods afterward, on the thighs, arms, and trunk of the body. The hands are seldom spotted with them, and the face is generally free. They are usually of a bright-red colour when they first appear, but they soon become livid or purple, and when they are about to disappear they change to a brown, greenish-yellow, and pale-yellow hue. When they arise successively, then the surface presents a variety of colour. The cuticle over them is smooth and shining, but is not sensibly elevated; in rare instances only has it been raised, or assumed the appearance of a vesicle containing dark blood. This appearance has more frequently been observed as regards the spots in the gums, cheeks, palate, and fauces, where the slightest force ruptures the epithelium and allows the blood effused to escape. Slight pressure, also, in any part of the surface often produces the exudation of blood, and *ecchymoses* and vibices in that part.

11. In connexion with this disposition to exudation of blood in the integuments, there is a still more marked disposition to exudation of this fluid, and often in large quantity, from the internal surfaces, especially the mucous. These hemorrhages are not only sometimes profuse, but are also restrained with difficulty, and are even occasionally suddenly fatal. In a majority of cases, however, they are less abundant; and in a few instances they have recurred daily at stated periods. Other cases present only occasional and irregular effusions of blood, and some are attended by an almost constant oozing. The bleeding occurs most frequently from the gums, cheeks, fauces, tongue; from the stomach and bowels; from the kidneys, bladder, uterus, or vagina; from the nose, bronchi, or lungs; and more rarely from the conjunctiva and external ear. There is the utmost variety as to the period of the disease in which the hemorrhages commence and cease, and as to the proportion which they bear to the exudations in the integuments which chiefly mark the character of the diseases, in connexion with the general disposition to hemorrhage.

12. The duration of this variety is extremely uncertain. It may continue for weeks or months, and even, in very rare instances, for

years; and at some period, especially upon sudden exertion or excitement of the circulation, hemorrhage may occur to a profuse, dangerous, or even fatal extent. When the disease terminates fatally, the result is to be imputed to the amount of hemorrhage, internal or external, or to the vital exhaustion more slowly caused by a continued oozing of blood; and in this case emaciation, œdema of the extremities, and occasionally serous effusions into either of the shut cavities, precede dissolution.

13. VAR. iii. *PURPURA URTICANS*.—SYNON. *Porphyra urticans*, Good. *Nettle-rash Scurvy*.—This variety is merely a rare modification of the first. It is distinguished by commencing in rounded reddish elevations of the cuticle, resembling the small weals of urticaria, but it is not attended, like them, by any tingling or itching. As these small weals dilate they subside to the level of the surrounding surface, assume a darker, and at length a livid hue. As they generally appear in succession in different places, they present different tints; the more recent being of a brighter colour, the older spots being level, and of various degrees of lividity. They are most frequently seen on the legs, mixed with petechiæ, but they sometimes also appear on the thighs, arms, and breast. The duration of this variety is from three to six weeks. Hemorrhages very rarely occur in the course of it. This variety sometimes attacks delicate young females, and in them it is generally attended by some œdema of the extremities. In one case, which occurred in a young lady under my care, it soon disappeared after an attack of menorrhagia and the treatment adopted for this attack.

14. VAR. iv. *Purpura Senilis*.—SYNON. *Senile Purpura*.—*Scurvy of Old Age*.—This variety is rarely met with, and occurs chiefly in aged females who live on a poor and insufficient diet. It appears principally on the legs and forearms, in successive dark or purplish spots or blotches, of irregular forms and various sizes. Each of the spots continues from ten to fifteen days, when the exuded blood is absorbed, and they disappear; but a repeated series of these blotches may continue to appear for months or even years. The health does not appear to suffer so much in this variety as in the preceding. I have not seen, among several cases that I have observed, one instance of hemorrhage supervening in the course of this variety. Dr. BATEMAN states, that he has met with this affection only in elderly women, and on the outside of the forearm. I have seen it sometimes in elderly males, and more frequently in the legs than in the forearm.

15. II. COMPLICATIONS OF PURPURA.—The complications of purpura are extremely diversified; for not only may this change in the skin supervene in the course of the adynamic and malignant states of fever, but it may be almost, although in very rare instances, co-existent with fever, the purpura assuming a *febrile character*, and not being merely a contingent phenomenon in the advanced progress of fever. Moreover, even the non-febrile purpura may be complicated not only with hemorrhages from mucous surfaces, and into various structures, but also with various states of visceral lesion. It will be useful to notice these several associations more fully.

16. i. *With Fever*.—*Purpura Febrilis*.—*Exanthema hæmorrhagicum*, GRAVES.—This complication of purpura may be *sporadic*, or even *epidemic*, as shown by LORDAT, LATOUR, RAYER, and others. *Febrile purpura* may attack persons of all ages and of every state of constitution. It usually commences with great lassitude and a feeling of vital depression, by chills or rigours, followed by heat, pains in the back and limbs, headache, a sense of oppression or of heat over the body, by nausea, retching, and by rapid pulse. Petechiæ and ecchymoses appear from the third to the sixth day, sometimes without hemorrhage from the mucous surfaces—*purpura febrilis simplex*, sometimes with such hemorrhage—*purpura febrilis hæmorrhagica*. In most cases, more or less fever precedes the change in the skin for a few days; very rarely is the fever and the purpura nearly simultaneous; and not unfrequently, with the vascular reaction characterizing the febrile attack, or about the second or third day, exanthematous patches, resembling urticaria, first appear, and are followed by purplish petechiæ and ecchymoses. Hemorrhage from the mucous surfaces seldom occurs in febrile purpura, until the characteristic change has taken place in the skin, the hemorrhage being consequent upon the purpura, as the purpura usually is on the fever; both forms of sanguineous exudation being strictly symptomatic of the fever, or complications of it.

17. The duration of this complication is usually from fourteen to twenty-four or thirty-one days; but it may terminate *fatally* at an earlier period, and seldom later than the twenty-fourth day. This event generally takes place in consequence of hemorrhage from the bowels, the stomach, the lungs, &c.; or into the substance of an organ, as the brain, lungs, spleen, &c.

18. ii. *The cachectic association* of purpura is the most frequent; indeed, purpura is eminently a cachectic malady, proceeding from causes which affect the vital tone and condition of the tissues, and consisting of changes not only in the condition of the textures, but also in the state of the blood. This cachectic habit of body both precedes the purpura and attends it, and favours the occurrence of hemorrhage, which so frequently takes place, and is one of the most important complications of the malady. The evidence of cachexia is, however, not limited to the supervention of hemorrhage, but is supported by the appearance of the countenance, of the cutaneous surface, even before the purpura appears, by the states of several assimilating and excreting functions, and by the condition of the whole frame.

19. iii. *Visceral complications* are very common, especially in the more chronic and severe cases. Very few of these cases are unconnected with functional or structural disease of the liver, or spleen, or both. I have repeatedly seen purpura, even in children, associated with great enlargement of the spleen; and in these cases the cachectic appearances have been most marked. I have seen, also, purpura follow protracted intermittents, the abdominal viscera being also more or less diseased; and in rarer instances associated with chronic diarrhœa, and enlargement of the mesenteric gland.

20. iv. *The hemorrhage in purpura* occurs chiefly in the variety denominated hæmorrhagic.

gica, and but rarely and contingently in the other varieties. It appears most frequently as epistaxis in children and young subjects; as metrorrhagia in females; and as intestinal and pulmonary hæmorrhage in adults. When it takes place from the mouth or gums, it is often associated with bleeding from the edges of the tongue, from the fauces, and from the nose. Hæmatemesis is also then not infrequent. When purpura occurs at an advanced age, it is often attended by hæmorrhage from the bowels or urinary organs.

21. v. The Appearances of the Blood and Urine.

—(a) The chief changes in the blood consist in the physical conditions and appearances of this fluid, rather than in its chemical constitution, which, however, is so far altered that a very marked deficiency of fibrin has been ascertained. I have treated several, indeed many, cases of purpura, but I never had occasion to bleed one. The appearances of the blood which has escaped furnish no small proof of its condition. Cases, however, have occurred in which blood has been taken from a vein; but these cases have been attended either by signs of vascular plethora, or by excited vascular action—states likely to change the blood, or at least to be connected with a condition of the blood very different from that which usually exists in this malady. In a case of marked purpura hæmorrhagica, where much blood was lost, recorded by Dr. DUNCAN, the blood, while flowing slowly from the vein, resembled diluted arterial blood, formed a loose coagulum, from which no serum separated; the coagulum being like jelly, tremulous, transparent, and colourless, the colouring matter having subsided to the bottom of the vessel. In other cases detailed by JEFFREYS, GAIRDNER, FAIRBAIRN, and COMBE, the blood was pale, coagulated slowly, formed a tremulous jelly, separated no serum, and nearly resembled that described by Dr. DUNCAN. The blood which I have observed in the hæmorrhages occurring in the course of the disease did not coagulate, and appeared without fibrin and vital crasis, and deficient in hæmatosine.*

—(b) The urine, in the cases where I have had an opportunity of observing it, was generally of a dark colour, emitting an ammoniacal odour, and usually presenting an alkaline reaction. It appeared to contain much of the earthy phosphates, and soon became offensive and very alkaline.

22. III. APPEARANCES ON DISSECTION vary remarkably with the form, complication, and amount or seat of hæmorrhage.—a. The mem-

* In a case of this disease, the blood discharged from the mouth was examined by SIMON. It contained much saliva, and some flocculi of mucus, but no fibrin. It had a faint disagreeable smell, was of a dark (almost black) red colour. It was composed of

Water	948.889
Solid residue	51.111
Fat	1.377
Albumen and mucus	34.032
Globulin	5.610
Hæmatin	0.102
Alcohol extract, bilin, and salts	4.635
Water extract, ptyalin, and salts	2.555
Biliverdin	0.366
In a case analyzed by ROUTIER, in 1000 parts he found	
Water	795.244
Solid constituents	204.756
Fibrin	0.905
Blood corpuscles	121.701
Residue of serum	83.405

—(SIMON'S *Animal Chemistry*, by DAY, vol. i., p. 316-319).

branes of the brain are seen, in some instances, spotted with ecchymoses; and small clots of blood and ecchymoses of various sizes, from that of a pin's head to that of a bean, are found in the convolutions of the brain. The surfaces of the ventricles present small petechiæ, and these cavities contain much serum. In some instances the effusion of blood within the cranium is in larger quantity, forming one or more large coagula, the patients having died comatose or apoplectic, with or without palsy. The mouth, fauces, and pharynx, and often also the œsophagus, are covered with black spots and ecchymoses.—b. The external surface of the lungs is often thickly studded with ecchymoses. This organ is commonly congested with dark blood, and parts of it sometimes present circumscribed engorgements; and in rarer instances circumscribed hæmorrhage into its substance, or pulmonary apoplexy.—c. The pleura and the pericardium, also, often present numerous ecchymoses or livid patches. The substance of the heart is often somewhat soft and easily torn.—d. The serous, and, still more, the mucous membranes in the abdomen almost always exhibit ecchymoses or patches of exuded blood; the mucous epithelium, and even the membrane itself, being detached or softened in parts.—e. The urinary surfaces are sometimes similarly changed.—f. I have seen the spleen remarkably enlarged and softened; and the liver also soft, friable, and of a pale hue. The most remarkable change, and one which has not been sufficiently considered, especially with reference to the pathology of the disease, is the general want of vital cohesion, or the softening and friability of the tissues, which exist immediately after death.

23. IV. DIAGNOSIS.—It is scarcely requisite to advert to the diagnosis of this malady. Its external characters mark it sufficiently; and when it assumes the features of hæmorrhage on the one hand, or of scurvy on the other, the pathological condition is that which should be recognised, and not the nosological distinction. In scurvy, however, the gums are more prominently affected, and the ecchymoses are most evident on the extremities, and are larger. (See art. SCURVY.) Adynamic and malignant fevers, continued and exanthematic, are often accompanied with petechiæ or purple spots or patches, identical with those of purpura, and sometimes with hæmorrhages; but these maladies retain their own distinctive or specific characters, and proceed from determinate causes, which are entirely unconnected with this disease.

24. V. PROGNOSIS.—*Purpura hæmorrhagica*, which shows itself by ecchymoses on the skin, is a more serious disease than that which appears by petechiæ; and even this latter form is more dangerous than *purpura simplex*, or purpura without hæmorrhage. RAYER observes, that *purpura febrilis* and *hæmorrhagic fever* are less serious than those forms of *hæmorrhagic purpura* which commence without fever, but become febrile after hæmorrhage has recurred several times; and that a small, hard, and very frequent pulse—from 130 to 140 in a minute—is often precursory of a renewal of the hæmorrhage, or of other serious symptoms.

25. Ecchymoses on the nose are often followed by profuse epistaxis; palpitations or op-

pression in the chest, with or without cough, are frequently followed by hæmoptysis; and pulsations in the epigastrium by hæmatemesis. If these hemorrhages recur often; if the blood does not coagulate, or is thin and watery, or exhibit a sanious appearance; if the signs of cachexia are manifest, and if those of anæmia are also present; if the pulse be very small, rapid, or weak; if the bowels become relaxed, with black or bloody evacuations; if the matters vomited present a black, grumous appearance; if the evacuations be attended by faintness or by syncope; if hemorrhage take place from the tongue and from the urinary organs, the danger is great, and the patient should not be allowed to assume, especially suddenly, either the sitting or standing posture, or to make the least exertion. All the evacuations should be passed in the recumbent position, lest fatal syncope take place on passing them. If a prompt and decided treatment fail of affording relief in cases attended by one or more of these symptoms, the danger ought to be viewed as not only great, but also imminent. The occurrence, also, of lethargy, or coma, or apoplexy, especially when the case has been unattended by external hemorrhage, is generally fatal.

26. VI. CAUSES.—This malady occurs at every period of life, and in both sexes; but most frequently in women, and in boys before the age of puberty; especially those of delicate constitutions, who live in cold, humid, and miasmatic situations, or in low, damp cellars, or in apartments which allow the dampness or exhalations from the soil to pass through them, and in houses which have no cellars or sunk areas. It affects chiefly also those who live in close, crowded, and ill-ventilated lanes, closes, or houses; who are employed in sedentary occupations, in close and densely inhabited towns; who suffer from mental anxiety, the depressing emotions, from fatigue and want of sleep; and those more especially who live on a poor, nutritive, or unwholesome food, or who have too little food. It may attack those, also, who live too exclusively on animal food, and deprive themselves of a sufficient quantity of fresh vegetables and fruits. It was remarkably prevalent during 1846 and 1847, when the crops of potatoes and of vegetables were generally blighted and scarce; potatoes and other vegetables, farinaceous food and milk, in due quantity and proportion, manifestly tending to preserve the blood in a state incompatible with the existence of purpura and scurvy.

27. Purpura has also followed other diseases, or appeared during convalescence from them, especially from small-pox, measles, scarlet fever, and affections of the liver or spleen, and in children after various disorders of the digestive organs. It has also followed remittent and intermittent fevers. It has occurred, however, in persons previously healthy, and in those who have appeared to live well, and in healthy localities; but I suspect that even in these the modes of living may not actually be wholesome; that too much animal food is habitually partaken of, either absolutely or relatively, to the proportion of vegetable substances, and that the animal food is not always of the most wholesome kind; that it is either imperfectly preserved or cured, or consists of pork, veal, and other indigestible or hurtful articles, or of the blood or

viscera of animals; and that, in connexion with an excessive use of animal food, congestion and oppletion of one or more of the internal viscera, especially the abdominal viscera, are produced. Hence the relief often observed to follow losses of blood in the course of purpura, and, in some cases, the entire disappearance of the disease after such losses. Purpura is said to have been hereditary in a few instances; it may even be epidemic or endemic in some parts; and instances of its prevalence as an endemic and epidemic have been recorded. The nature of the causes will readily account for such manifestations of it on some occasions, especially when several of these causes concur to produce it.

[Owing to causes sufficiently obvious, *purpura hæmorrhagica* only occasionally appears, and that as a sporadic disease, in this country. In this form it is sometimes to be seen, especially in our larger cities, and then for the most part in peculiar localities, and affecting the impoverished, the dissolute, and those habituated to alcoholic potations. As the sequela of other diseases, it is by no means so rare an occurrence, and most practitioners must have encountered it as often following our more malignant forms of bilious intermittent and remittent fevers. That type of the disease denominated by RAYER the *purpura febrilis*, though generally deemed less serious in its nature, is, nevertheless, capable at times of assuming a highly malignant character; and, about three years ago, was recognised prevailing as an epidemic on Long Island, near Williamsburgh, opposite the city of New York. A combination of local causes, as the impure air of a limited district near the salt water, aggravated by the air of badly-constructed and ill-ventilated apartments, and the foul materials of ships and docks, seemed to have been the prominent causes to which it owed its origin. In two instances several members of the same family were cut off by it. The number of cases might have been twelve. The disease terminated fatally in several cases after the fourth or fifth day's duration. In those who recovered, the most diffusible stimuli, tonics, and nutrients were had recourse to. The most effective treatment was the tonic and stimulant. It is hardly to be credited, says Dr. J. W. FRANCIS, how large a quantity of vinous, spirituous, and fermented drinks, blended with nutritious aliment, the patient took in order to secure his recovery. *Purpura hæmorrhagica* afflicted the Texan troops in the campaigns of 1836-7. The middle-aged suffered most by it. It arose from the want of fresh provisions, according to the testimony of the surgeon-general of the Texan army, Dr. ASHBELL SMITH. In many instances the disease was characterized by large maculæ on the legs, and excessive hemorrhage from the bowels. Its worst forms occurred in impoverished habits. Those who lived mostly on fresh pork and on fresh beef, with little or scarcely any salt, paid the severest penalty. The deaths were not a few. Bark and wine were the tonics most relied on. The nitrate of silver in strong solution was administered in many cases when the hemorrhagic loss from the bowels was most annoying and prostrating. Almost all our prominent writers have noticed *purpura hæmorrhagica* in connexion with yellow fever, as it has prevailed in our sea-ports at dif-

ferent periods in the United States, viz., in 1798, 1803, 1805, and 1822. See TOWNSEND on *Yellow Fever* in 1822; the *American Medical and Philosophical Register*, edited by Drs. HOSACK and FRANCIS; *New-York Medical and Physical Journal*, edited by Drs. FRANCIS, DYCKMAN, BECK, &c.; RUSH on *Yellow Fever*.]

28. VII. TREATMENT.—The treatment of purpura depends essentially upon the habit of body, and age, and strength of the patient. If the patient be plethoric, and the pulse full and strong, or if evidence of visceral congestion or oppletion exist, and if the purpura be simple or not complicated with hemorrhage, or if the hemorrhage has been inconsiderable, a moderate blood-letting will then be of service; but the disease may be removed without it; and it ought not to be prescribed if there be evidence either of anæmia, or of deficient crasis of the blood. By bleeding in these circumstances, we do not only diminish the already deficient proportion of blood globules and the impaired vital crasis of the blood, but we also lower the already depressed vital tone of the vessels; and we also disturb, or even altogether overturn, the mutual dependance subsisting between the blood-vessels, especially the capillaries and their contents. If we at all base our treatment upon the pathology of the disease, blood-letting will rarely be required, and only in moderation, in the circumstances just mentioned; and probably, also, when the cases thus circumstanced have presented somewhat of a febrile character.

29. Viewing the disease as essentially dependant upon impaired vital tone, and cohesion of the capillaries and of the several tissues, with more or less manifest change in the blood, either proceeding from or connected with impaired assimilation and excretion (§ 26, 27), I have hardly ever directed vascular depletion, but have prescribed those remedies which appeared to me the best suited for the removal of these pathological states; and I have never found, in the many instances in which I have prescribed it since 1817, the *oleum terebinthinæ* fail in removing the disease when prescribed in a suitable form or dose, or in such combinations as the peculiar features of the case required. Numerous other means will often succeed in curing this malady; but there is none so efficacious as this in the hemorrhagic states of the disease, and none which will be more beneficial, conjoined with purgatives, in the several circumstances requiring a purgative treatment. If we wish to arrest the hemorrhagic disposition, the turpentine should be given in doses varying from half a drachm to a drachm three or four times daily; and if the vital powers be much depressed, a few drops of tincture of capsicum, or of some aromatic tincture, may be conjoined with it. If it be more desirable to act upon the bowels, then it may be prescribed in much larger doses, with castor oil on the surface of an aromatic water, or in any other mode; or it may be administered similarly conjoined in enemata. If the exhibition of it by the mouth produce vomiting, this occurrence may prove salutary, or may even be promoted, as tending to emulge the biliary ducts, and to remove congestion of the abdominal viscera. If, on the other hand, it should be preferred neither to risk nor to produce this effect, or even the unpleasant sensations which it may produce when thus exhibit-

ed, then the administration of it in enemata, in moderate doses, with a few drops of tinctura opii, or with a drachm or two of tinctura camphoræ comp., repeating the enemata frequently, or according to the period of their retention, and to their action on the bowels, will be very beneficial. If the patient complain of abdominal pains and flatulence, epithems of turpentine, or liniments or embrocations containing it (see APPENDIX, Form 295-297, 311), may be applied over the abdomen, or frictions with these may be directed.

30. Many other remedies will be found more or less serviceable in the various states of purpura. When the disease is complicated with enlarged spleen, or when there is manifest anæmia produced by losses of blood, and especially when the attendant hemorrhage has been restrained by the turpentine as advised above, then the preparations of iron will be most beneficial. The tincture of the sesquichloride of iron may be given either alone, or with an addition of hydrochloric acid, in the infusion of calumba; or the sulphate of iron may be conjoined with the sulphate of quina, camphor, and as much of the purified extract of aloes as will act sufficiently on the bowels, this latter, when conjoined with the quina, operating sufficiently in very small doses. These and other tonics may likewise be prescribed with purgative salts, and with the acids which are compatible with them. If the functions of the liver are torpid, the nitro-muriatic acids may be given in tonic infusions; and even a dose of a mercurial may be prescribed occasionally. In these cases, and especially when the purpura is associated with congestion of the abdominal viscera, a full dose of calomel, with an aromatic, should be given at bedtime, and either a turpentine or castor oil draught, or other purgatives, with tonics, the following morning and day, until the bowels are freely evacuated. The compound infusion of roses, with either of the sulphates and a tonic tincture; or the compound infusion of gentian, with the sulphate of magnesia, sulphuric acid, and tincture of orange-peel, or similar combinations, may be prescribed with this intention, and repeated according to their effects; the calomel being also repeated if the congestion continue.

31. In the febrile state, as well as in other forms and complications of the disease, the decoction of cinchona may be directed, with liquor ammoniæ acetatis, the acetic acid being in excess; or the same decoction may be conjoined with the chlorate of potass, or with the hydrochloric acid, the hydrochloric ether, and tincture of serpentaria, purgatives being employed from time to time, according to the state of the case. Purgative enemata also may be occasionally employed, especially those containing the spirit of turpentine. In some instances I have found the decoction of cinchona and tonic infusions more serviceable when conjoined with small doses of the nitrate of potash and carbonate of soda or of potash. The treatment I have advised for the more asthenic forms of HEMORRHAGE (§ 45, *et seq.*) will also be found appropriate to this disease; and that for SCURVY will often prove as successful in this as in that malady.

32. The diet and regimen during the treatment requires attention. The causes (§ 26) should be

avoided as much as possible, and the food ought to be light and digestible. Milk should be freely allowed, in conjunction with rice and farinaceous articles. Animal food ought to be partaken of sparingly, and fresh vegetables and fruits freely allowed. The beverages may consist of lemonade, or of diluents rendered pleasantly acid with lime-juce or pomegranate-juice. Spruce-beer, especially the Dantzian spruce; Seltzer-water, soda-water, with sherry or hock, or Seltzer-water with milk, or water made pleasantly acid with raspberry-vinegar, will generally be both agreeable and beneficial.

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1. PUS—Pus, Fr.; Eiter, Germ.—is a morbid secretion, from an inflamed or otherwise altered animal tissue or tissues, depending upon a change from the healthy state of the capillaries of the affected part, and probably also of the organic nerves supplying the capillaries and tissues implicated. It is one of those pathological formations which is foreign to the economy, and is incapable of organization, beyond that which it already possesses in its independent cells. Its pathological relations are fully considered in the articles *ABSCESS, DISEASE* (§ 131, *et seq.*), and *INFLAMMATION* (§ 44, *et seq.*); but since these were written recent microscopic researches have thrown farther light upon the

constitution of this fluid, although much yet remains to be determined respecting its relation to the blood in the capillaries of the parts, upon or in which it is formed.

2. In order to understand recent views respecting pus it is necessary to premise the principal topics connected with the *cell-theory* of formation, nutrition, and morbid fomentations, which has very lately been promulgated in Germany. According to SCHWANN, the author of this theory, development is always dependant upon a formation of cells in an amorphous *plasma*, which, when giving rise to organized formations, or the production of cells either in independent forms, as in the fluids, or variously continuous or coalesced, as in the several tissues, he has termed *cytoblastema*, or, for brevity, *blastema*; and the formation proceeds in this manner, according to the description of VOGEL. In the first place, one or more minute granules—*nucleoli*—appear, around which the cytoblast—*nucleus*—is formed; and this, again, becomes surrounded by a membrane—the *cell-wall*—which at first closely envelopes it—the nucleus; but subsequently the cell-wall, in the course of its growth, becomes separated from the nucleus, thus leaving a cavity between them. This is termed the cavity of the cell, and is filled with a substance differing essentially in character both from the nucleus and from the cell-wall. In the cell thus produced, the nucleus is not in the central point, but is situated eccentrically at a point on the inner surface of the cell-wall. It is from these cells alone, by a process of farther development, that all organized products arise.

3. That this mode of development from cells takes place in morbid as well as in normal formations may be readily shown in numerous cases; and, as VOGEL remarks, can be most obviously traced in the formation of pus corpuscles. SCHWANN describes the corpuscles of pus as peculiar cells which are formed in the serum of pus—the *cytoblastema*, exuded during inflammation, in increased quantity and of anomalous composition—precisely in the same manner as mucous corpuscles originate in mucous, and, indeed, as all cells form in their cytoblastema. Pus corpuscles appear to be earliest formed upon the surface of the granulations, owing to the circumstance of the pus-serum—their cytoblastema being constantly exuded at that part, and with the greatest amount of plastic force. SCHWANN considers it most likely that the nuclei of the pus corpuscles are first formed, and that the pus cells pursue an independent growth for a period. The more healthy the pus, the greater is its plastic force, and the greater the number of cells which are formed in it, so that in healthy pus the quantity of serum is small in comparison with the number of cells.

4. VOGEL states, that when pus is produced from a fluid blastema on a free surface, or in a cavity connected with the exterior of the body, numerous isolated granules are first seen, and that these granules become surrounded by a very delicate transparent cell membrane, which subsequently forms so thick and opaque a wall that the nucleus can no longer be seen through it; but the addition of acetic acid, which either dissolves the cell-wall, or renders it transparent, again renders the nucleus visible. As

to the early relations of the nucleus and nucleolus, he cannot determine whether or not the nucleolus exists prior to the nucleus—that the nucleolus is, as it were, the means of forming the nucleus in the same way as the nucleus forms the cell. In some cases he thinks that this may happen, but certainly not in all. VOGEL agrees with HENLE, in opposition to REICHERT, in believing that SCHWANN's cell-theory represents only one of the various forms of development, of which the type in different cases may present very numerous differences. The English reader will find this theory developed in Mr. HENRY SMITH's Translation of SCHWANN and SCHLEIDEN's researches for the SYDENHAM Society, and this and other pathological subjects fully discussed in Dr. DAY's very excellent translation of, and additions to, VOGEL's *Pathological Anatomy of the Human Body*, where the pathology of *pus* is ably considered and at great length. The recent literature of this formation is abundant; but there is nothing furnished by the numerous authors who have written on it essentially different from the results furnished by SCHWANN and VOGEL.

[The *pus* corpuscles are peculiar cells which are formed in the serum of *pus*, *i. e.*, in cytoblastema, exuded during inflammation in increased quantity, and of anomalous composition, precisely in the same manner that mucous corpuscles originate in mucous, and, indeed, as all cells form in their cytoblastema. According to some recent observations, they are earliest formed upon the surface of the granulations, and for the reason that their cytoblastema, the *pus*-serum, is constantly exuding freshest at that part, and therefore possesses, in that situation, the greatest amount of plastic force, as we see in the formation of new *yolk*-cells, on the outside and in the neighbourhood of the vitelline membrane. It is, however, probable, that the *pus*-cells pursue an independent growth for a period, as in *yolk*-cells, far removed from the vitelline membrane; and the nuclei are also probably their first-formed part. The more healthy the *pus*, the greater is its plastic force, and the greater the number of cells that are formed in it, so that in healthy *pus* the quantity of serum is very small in comparison with the number of cells. The mucous, *pus*, and lymph corpuscles are then small round cells, with a nucleus attached to their walls. According to HENLE, mucous and *pus* corpuscles cannot be distinguished in any way from one another, and those of lymph differ from them only inasmuch as their nucleus is more round and granulous, and does not crumble under the action of acetic acid; but no difference exists between them in the form of the entire cell. The blood corpuscles present a higher degree of development. In them we find not only very characteristic cell contents, the red colouring matter, but the form of the cell also undergoes an important alteration, inasmuch as it becomes flattened; and as this flattening takes place in cells which float free in a fluid, it cannot be explained as the result of mechanical causes, but must manifestly be regarded as a peculiar stage of development of those cells. The nucleus is persistent in all these cells, while in those more highly developed it usually disappears at some subsequent period.]

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PUSTULAR ERUPTIONS.—SYNON. *Pustula*; *Pustulic*; *Φλύκταιναι*; *Ecpyesis*, Good. *Pustules*, *Boutons*, Fr. *Eiterblattern*, Germ. *Pimples*.

CLASSIF.—5th Order (Willan). 6th Class, 3d Order (Good). III. CLASS, I. ORDER (Author).

1. DEFIN.—*A pustule consists of a small and nearly rounded elevation of the cuticle, with an inflamed base, containing pus from the commencement of this elevation.*

2. WILLAN and BATEMAN distinguish four varieties of PUSTULES. 1st. *Phlyzaciūm*, a pustule commonly of a large size, raised on a hard circular base of a vivid red colour, and succeeded by a thick, hard, dark scab. 2d. *Psyracium*, a small pustule, often irregularly circumscribed, producing a slight elevation of the cuticle, and terminating in a laminated scab. Many of the *psyracia* usually appear in clusters and become confluent, and after the discharge of *pus* they pour out a thin watery humour, which often forms an irregular incrustation. 3d. *Achor*, a small acuminate pustule, containing a straw-coloured *pus*, having the appearance and nearly the consistence of strained honey, and succeeded by a thin, brown, or yellowish scab; and, 4th. *Fæus*, a larger and flatter pustule than *achor*, not acuminate, and contains a more viscid matter. Its base, which is often irregular, is slightly inflamed; it is succeeded by a yellow, semi-transparent, and sometimes cellular scab, like a honey-comb; whence it has obtained its name.

3. Pustules arise from an inflammation of the skin, and the consequent formation of purulent matter under the cuticle, elevating this latter into small circumscribed tumours. Most commonly the inflammation of the base of each pustule is distinct; but sometimes several or even many pustules arise from an extended inflamed surface. The fluid contained in the pustules desiccates and often terminates in a scabby incrustation, varying in hardness according to the tenacity of the contained fluid; sometimes in superficial ulceration. The number, form, and aspect of the pustular ulcerations in these latter cases, and even of the cicatrices which succeed them, should be attentively considered, as they are characteristic of the particular species of the pustular eruption. There is no class of diseases, and especially no class so limited as this is, that has so little in

common in their constitutional characters as this presents. It is only in the pustular eruption that they have any resemblance to each other; for some are contagious, and others are not, and some are acute, and others chronic.

4. Pustules are liable to be confounded with vesicles, especially when the latter, by a sort of reparative action, and by the greater intensity of the inflammation in their dermic bases, form pus, which mingles with the serum, and forms at first a sero-puriform, and subsequently a purulent or even a pustular vesicle. In such instances the eruption is actually vesicular, the pustular eruptions containing pus from their earliest formation.

5. Much difference of opinion exists among writers on diseases of the skin as to the eruptions which should be classed as strictly pustular. WILLAN and BATEMAN comprise five species: 1st. *Impetigo*; 2d. *Porrigio*; 3d. *Ecthyma*; 4th. *Viola*; and, 5th. *Scabies*. The disciples of BIETT, especially RAYER, CAZENAVE, and SCHEDEL, give a different arrangement. RAYER reckons seven forms of pustular eruptions: *Variola*, including *varicella*; *Vaccinia*, comprising *Vaccinella*; *Acne*, *Rosacea*, *Mentagra* or *Sycosis*, *Impetigo*, *Favus*, and *Ecthyma*. To these MM. CAZENAVE and SCHEDEL add *Glanders*. Mr. WILSON, however, reduces the species of pustulæ to two, namely, *Impetigo* and *Ecthyma*, and proceeds to remark that the genus *Porrigio* of WILLAN comprises eruptions of the most opposite kind, and has been the source of much confusion, so much, indeed, that it would be well that the term for the future should be discarded. *Scabies*, again, is a disease presenting several elementary forms, of which both vesicles and pustules are accidental, and only occasionally present.

6. Although *variola* is a pustular disease, still it is more appropriately classed with the exanthemata, and others comprised by RAYER would be as well arranged under different genera. The causes, characters, and modes of terminations of pustules have reference merely to the individual species, as neither of these is common to all the species, however their number may be limited. Their diagnosis and treatment are, therefore, to be considered under their several heads, where they are treated of by the names usually applied to them: the question as to the eruptions which should be viewed as strictly pustular becoming apparent in these places, all arrangements of these eruptions being entirely conventional.

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PUSTULE, MALIGNANT.—SYNON. *Malignant Pustule*; *Pustula maligna*; *Contagious Carbuncle*; *Persian Fire*; *Charbon malin*.—*Pustule maligne*, CHAUSSIER. *Bouton malin*; *Anthrax malin*; *Anthracion*, RAYER. *Gangrenous Pustule*; *Malignant Carbuncle*.

CLASSIF.—III. CLASS, I. ORDER (Author).

1. DEFIN.—A large vesicle filled with a sanious or sero-sanguineous fluid, under which a lenticular induration is formed, which is speedily surrounded

by a phlegmous erysipelatous areolar swelling, a larger or smaller portion of which soon becomes gangrenous.

2. I. CAUSES.—This malady is very rarely seen in this country, although it is not uncommon in some parts of France and of the Continent. It is generally caused by the contact of some poisonous animal fluid or matter, which, from the nature of its effects, may justly be classed as a *septic poison*. ENAUX, CHAUSSIER, and many others are of opinion that malignant pustule constantly follows contagion or inoculation, or the contact of this gangrenous tumour, or of the offal or blood of animals affected by it. They state, in support of this opinion, 1st. That it has been seen most frequently in smiths, veterinarians, shepherds, graziers, tawers, tanners, butchers, knackers, mattress-makers, &c., or those who have the care of animals, or who handle their carcasses and offal. 2d. That it appears exclusively on parts of the body which are most exposed, as the face, neck, hands, arms, &c., or have been exposed accidentally. 3d. That it has been most frequently observed in human subjects during opizooties, attended by buboes and carbuncles. They farther state, that the sanies poured out by the disease is one of the means by which it is propagated. M. RAYER observes, that the blood of a sheep affected with this disease having flowed over a shepherd's hand, produced malignant pustules; and that a butcher was attacked in the tongue from having taken the knife with which he was skinning an ox between his teeth for a few seconds. These statements, M. RAYER adds, are in accordance with the results of M. QUERET's researches on the changes undergone by the blood in different diseases. It has even been contended that the blood of over-driven cattle has produced this malady, and instances have been adduced in support of the fact; but this requires confirmation, or farther investigation.

3. It is stated by THOMASSIN that a woman, while dressing the gangrenous sore of her husband, having touched her cheek soiled with some of the discharge from the sore, became affected in two hours with anthracion, in this situation, that spread with alarming rapidity. HUFELAND says, that a woman caught this malady from a female affected by it with whom she had slept. But it is contended by JEMINA, on the authority of several practitioners, and supported by various experiments communicated to MALACARNE, that the malignant pustule caused by contact of an animal affected with it cannot be transmitted from one individual of the human species to another; and M. RAYER states that one of his pupils, M. BONET, inoculated himself with the matter of anthracion without being infected.

4. It has been supposed that malignant pustule may occur sporadically in the human subject, owing to the nature of the ingesta, or of other causes, as a modified or malignant form of furunculosis. The nine cases of *gangrenous pustule* detailed by M. BAYLE certainly closely resemble cases of malignant pustule, or anthracion, and the persons who were their subjects had never touched the remains of any animal which had died of anthracion, or had partaken lately of any suspected animal food. M. DAVY LA CHEVRIE has recorded six cases of this mal-

ady, in which no evidence could be detected of infection from another person, or from a deceased animal. It would appear, that although many cases of anthracion may be traced to the contagion or contact of morbid matters from the lower animals, and to contagion from the human subject, as contended for by some, and most probably with truth in certain circumstances, yet other cases may occur sporadically, as it has been impossible to trace the malady to contagion in some instances. But it is not unlikely some severe cases of carbuncle have been mistaken for the contagious malignant pustule.

5. M. RAYER says, that anthracion is pretty common in several districts of Franche-Comté, in Lorraine, and especially in Burgundy; but that it is rare in Paris. He has, however, met with it in butchers, tanners, and more frequently in workmen engaged in dressing hides, skins, and wool; and he met with several cases which came from a manufactory of which the business was cleansing and dressing hair from Russia.

6. II. SYMPTOMS.—The description of malignant pustule has been fully given by RAYER, ROCHOCX, and the writers already mentioned; but I shall chiefly follow that given by M. RAYER. When the malady is caused by contagion, the interval between the time of infection and the eruption of the gangrenous spot varies from a few hours to five or six days. If the intensity of the disease be made the basis of a division, the cases may be arranged under three heads: 1st. *Slight anthracion*, with circumscribed mortification. 2d. *Severe anthracion*, with diffused gangrene. 3d. *Fatal anthracion*, with alterations in the blood, and in one or several of the viscera.

7. *A. Anthracion with limited gangrene*, or the "*pustule maligne prominente*," begins with a seropurulent or sanious elevation, the base of which is hard, tense, and deeply seated, and is soon surrounded by a phlegmono-erysipelatous inflammation. The central point of the tumour is attacked with gangrene, but it rarely happens that the mortification extends beyond this primary seat, the disorganization soon stopping spontaneously.

8. *B. Severe and diffuse gangrenous pustule*, or *anthracion*, commences with much pruritus, followed by the appearance of a red spot like a flea-bite. The vesicle, at first of the size of a millet-seed, soon acquires larger dimensions, and, if not ruptured by the patient, bursts spontaneously. From twenty-four to thirty-six hours after the pruritus, a small, hard, circumscribed nucleus, of the form and size of a lentile, is felt under and around the vesicle; and in the circumference a soft but somewhat resisting swelling is developed, of a reddish or livid colour, covered by-and-by with secondary sero-sanguinolent vesicles, at first discrete, but speedily becoming confluent. The central spot, now of a brownish hue, extremely hard, and very insensible, becomes gangrenous. The inflammation extends to a considerable distance and depth; the adjoining skin is dark-red and shining; and the sub-cutaneous cellular tissue is puffy, tense, and apparently emphysematous. The central part is numb or insensible, and gangrene advances rapidly.

9. If the malady continues to proceed, or tends to an *unfavourable issue*, the constitutional symptoms assume a severe form; the pulse is

small and weak; the tongue is dry and brown; the skin is parched; the patient complains of a feeling of anxiety; is attacked with fainting, or with leipthymia; his features are shrunk, and his eyes are glassy; his mental and physical powers are depressed; and cardialgia, eructations, hiccough, and low delirium precede dissolution. The duration of this variety of the disease varies from two or three days to several days.

10. If the malady ceases to make farther progress, and tends to a *favourable result*, a vivid red circle appears around the eschar; the swelling, which had spread extensively, diminishes at the same time, and the patient feels an agreeable warmth, accompanied with a pulsating motion of the affected part. The pulse acquires power, the strength and spirits increase, and, if febrile reaction is considerable, it is resolved by a gentle perspiration. Suppuration takes place between the living and dead parts, and the detachment of the eschar leaves a suppurating surface of various extent in different cases.

11. *C. Malignant pustule, with fatal contamination of the blood and viscera*, advances with frightful rapidity, death sometimes taking place in eighteen or twenty-four hours from its invasion. The local alteration in the integuments is occasionally of no great amount; the formidable symptoms and the fatal terminations are explicable only on the supposition that changes in the blood, or in the internal organs, or in both, have taken place to an extent incompatible with the continuance of life. M. RAYER has adduced two cases of this form of the malady which were treated by him and examined after death.

12. *D. Certain local modifications of the malady* have been observed. When anthracion attacks the *face*, it is attended by a phlegmonous erysipelas of the features, often extending to the neck and anterior of the chest. When the eyelids are the seat, it occasions an enormous and very painful tumefaction of the face, with intense headache and delirium, often with the loss of the eye, always with eversion of the eyelids, which are then formed by the orbicularis muscle and the conjunctiva alone. Wherever muscular fibres are contiguous to the skin, there the gangrene extends less deeply. Nevertheless, when the lower lip is attacked with anthracion, it is apt to be destroyed through a considerable extent either by the disease or by the caustics employed to arrest its progress. When the *neck* is the seat of the malady, the deep extension of the inflammation impedes respiration and deglutition; and pytalism, epistaxis, swelling of the face, &c., generally take place. If the parietes of the *chest* are attacked, the inflammation generally extends to the sub-cutaneous cellular tissue of the thorax and axillæ. When the back of the *hand*, or the *instep*, is the seat of anthracion, every part of the limb is successively attacked with a phlegmonous-erysipelas inflammation.

13. *E. Appearances after Death*.—In the more severe and general states of the disease, unequivocal symptoms of an altered condition of the blood, of congestive inflammation of the lungs, or of asthenic gastro-enteritis, or of the absorption of purulent sanies into the blood, are observed before death. M. LITTRÉ, in a case of anthracion of the lower lip, found pus within

the veins of the face, and a number of small abscesses in the substances of the lungs. In addition to the destruction of the integuments and adjoining cellular tissue of the affected part, marks of congestive inflammation with ecchymoses have been observed in the lungs, liver, spleen, and digestive canal. M. VIRICEL states, that he found malignant pustules in the colon; and M. LAMBERT says, that the gelatinous serous deposits always found in the adjoining subcutaneous cellular tissue is occasionally also found in the cellular tissue of the mediastinum. A quantity of sanguinolent serum is commonly effused into the serous cavities. The several tissues are more or less softened, and the viscera and blood present the same changes as are found in the malignant carbuncle of animals.

14. III. DIAGNOSIS.—On its first appearance the malignant pustule may be mistaken for the bite of an insect; but it wants the minute central yellowish point of an insect bite, and soon presents the painful indurated base, and the sanious vesicle with which malignant pustule commences, and which, with the diffuse or erysipelatous and emphysematous-looking inflammation surrounding it, also distinguishes it from furuncle, carbuncle, or anthrax. Malignant pustule in some instances, however, can hardly be distinguished from the more gangrenous form of carbuncle (*see art. FURUNCULAR DISEASES, &c., § 14, et seq.*); and it is most probable that the one affection runs into the other, those cases of sporadic anthracion which have not been traced to contagion being only instances of very severe carbuncle, the local and constitutional characters of which they have certainly possessed.

15. On the other hand, anthracion may be confounded with phlegmonous or gangrenous *erysipelas*, and with the gangrenous or sphacellating ulceration of the cheeks, and labia majora vulvæ met with in children, or even with the *bubo* or carbuncle of plague; and certainly cases of these occasionally very closely resemble anthracion, and if they be not seen at an early stage, or at their commencement, the diagnosis will be difficult, if not impossible in some instances. These, however, do not present the sanious vesicle or the puriform pustule with which anthracion originates; and the gangrenous affection of the cheeks of children commences in the inside of the mouth, and extends to the skin. From pestilential carbuncle and bubo anthracion is distinguished by the absence of the symptoms characterizing plague, and by the several circumstances attending either the one or the other. Cases of anthracion, however, are not so readily distinguished, as M. RAYER supposes, from the carbuncles in cases of sporadic or scattered plague. Indeed, he endeavours to draw distinction, but conceals close resemblances between this malady and those which are very closely allied to it, if they be not altogether identical with it. I would, however, infer, that the sporadic or noncontagious cases of malignant pustule, or the affection described as such, are severe cases of carbuncle (*see FURUNCULAR DISEASES, § 14, et seq.*); that the malignant pustule or anthracion, caused by the contact of a poisonous or morbid animal matter, consists of local changes which closely resemble the worst cases of carbuncle, and of a constitutional disturbance often of a more intense

and more rapidly fatal tendency than in the latter; and that the true anthracion or malignant pustule is generally infected by the morbid fluids of cattle, &c., and especially by the malignant carbuncle of animals, or that attacking sheep and other woolly and hairy animals, and which I shall briefly describe.

16. *The malignant carbuncle, or charbon, of animals* is characterized by the appearance of a voluminous uncircumscribed tumour, which yields to pressure, crepitates like emphysema, and exhales a peculiar putrid odour. The centre of the swelling is black, as if carbonized, and the circumference is infiltrated with a brownish or yellowish fluid, and distended by a very fetid gas. After death the substance of the heart is softened, and its external surface ecchymosed in the course of the blood-vessels. The blood in the heart and large vessels is generally fluid. In the veins it is very black, sometimes containing clots of a black or yellowish colour. The lungs are covered by small ecchymoses, which are also seen penetrating their substance. The stomach and intestines present black sanguineous ecchymoses, of various sizes, between the inner coats and under the peritoneum, and variously distributed in different parts of the canal. The liver and spleen are gorged with dark blood. The nervous system is said not to offer any change.

17. The same changes, local and visceral, which are found in the malignant carbuncle of animals are also found in the blood, heart, lungs, digestive organs, and other viscera in cases of fatal malignant pustule in the human subject; and, moreover, the discharge from the disease of the brute produces the same malady in man—malignant pustule or anthracion. The identity of both these diseases cannot, therefore, be disputed, although the spontaneous or sporadic appearance of anthracion in man may be disputed, or may want confirmation.

18. IV. PROGNOSIS.—The first variety may recover of itself, the gangrene terminating spontaneously, or being readily arrested by treatment. The second is much more serious, but it will generally be cured by the prompt and energetic use of caustics. The third variety is generally mortal, and it may end fatally in twenty-four or forty-eight hours from its appearance. The danger is always greater from the second variety, when it attacks the face, head, or neck, than when it affects the extremities. It is also aggravated by extremes of temperature.

19. V. TREATMENT.—M. RAYER states, that as soon as the existence of anthracion is ascertained, the part must be deeply scarified and extensively cauterized. To be effectual, the incisions should extend to all the gangrenous parts, but not beyond them. The vesications on the surface ought to be immediately opened and the fluid absorbed, and the denuded surface covered with a dossil of lint dipped in the liquid muriate of antimony, or with a small fragment of caustic potash, kept in its place by a strip of plaster and a bandage. Five or six hours afterward this application may be removed, and the eschar covered with lint spread with the unguentum resinorum, or some other salve of a similar kind. Instead of the caustics advised by M. RAYER, I would recommend the nitric acid to be freely applied, and to be followed by the usual dressings and the internal treatment pre-

scribed for gangrenous inflammation of the cellular tissue and for carbuncle. (See articles CELLULAR TISSUE, § 35, *et seq.*, and FURUNCULOUS DISEASES, § 20, *et seq.*)

20. Next day, if it be found that no vesicular areola has been formed around the eschar, and if the patient complains of but little pain, without smarting or pungent heat, it may be inferred that the cautery has included the whole of the disease. If, on the contrary, a hard and deep-seated tumour has appeared around the primary seat of the malady, and symptoms of phlegmous-erysipelatous inflammation are present, the caustic must be applied again, having first removed the gangrenous parts, after dividing them by a crucial incision. This procedure is also necessary when the slough, which forms the centre of the swelling, has already become hard and impermeable like a piece of leather; for it must be removed to admit of the action of the caustic being exerted on parts not yet sphacelated, after which they are to be covered with a stimulating poultice.

21. The value of *escharotics* in the treatment of malignant pustule is incontestable. They are indicated as long as the gangrene shows a disposition to spread, or while its limits are undefined; but, in order that the constitutional or vital powers should be enabled thus to limit the extension of the local mischief, and to resist the imbibition and absorption of the morbid matters of the gangrenous part—should oppose the general infection and contamination which the peculiar matter of anthraxion produces, and the consequent congestions, congestive inflammations, and visceral lesions which are observed in fatal cases, the powerful internal restoratives, aided by the aperients and enemata, that I have recommended in similar states of constitutional and local disease, should not be overlooked, but be promptly and efficiently prescribed. (See CELLULAR TISSUE, *Diffuse Inflammation*, § 35, *et seq.*; ERYSIPELAS, § 73, *et seq.*; INFLAMMATIONS, § 236, *et seq.*; GANGRENE, § 66, *et seq.*; and POISONS, § 698, *et seq.*)

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change of the blood without external gangrene.)—Bland, Nouv. Biblioth. Méd., t. ii. 1826, p. 18.—Wagner, Med. and Chirurg. Review, vol. xxix., p. 582.

PYLORUS. See STOMACH, Diseases of.

PYROSIS. —SYNON. Πυρσσις (from Πυρ, fire, and πυρω, fut. ωσω).—Pyrosis, Sauvages, Sagar, Cullen. Cardialgia sputatoria, Linnaeus, Good. Ardor ventriculi, Hoffmann. Soda, Gastrorrhæa, Ardor stomachi, Auct. Ardeur de l'Estomac, Cremason, Fr. Das Brennen; das Sodbrennen, Germ. Black-water, Water-brash, Heart-burn.

CLASSIF.—2d Class, Nervous Diseases. 3d

Order, Spasmodic Affections (Cullen). i.

Class, Diseases of the Digestive Function.

i. Order, Affecting the Alimentary Canal.—I. CLASS, I. ORDER (Author).

1. DEFIN.—Constrictive pain at the pit of the stomach, extending to the back, and bending of the body forward, followed in a short time by cructations, without nausea or retchings, of a large quantity of a thin, watery, and often insipid, fluid that afford relief.

2. The description furnished by Dr. CULLEN has generally been considered as most accurate, his experience of the disease in a country where it is prevalent having been considerable. But it is liable to the objections which may be urged against nosological descriptions, namely, that it represents merely a single type or phase of the disease; a single and distinctly characterized form, without any notice of the modifications and gradations which ally it to other disorders of the digestive organs. I shall first describe this affection nearly in the terms used by Dr. CULLEN, and afterward notice such variations as have fallen under my observation.

3. I. SYMPTOMS.—Pyrosis appears most commonly in persons under middle age, but seldom before the age of puberty. When it has once taken place, it is apt to recur occasionally for a long time after; but it seldom appears in persons far advanced in life. It affects both sexes, but more frequently the female. The fits of the disease usually come on in the morning and forenoon, when the stomach is empty. The first symptom is pain at the pit of the stomach, with a sense of constriction, as if the stomach were drawn towards the back. The pain is increased by raising the body erect, and is alleviated by bending forward. It is often severe, and after continuing for some time it is followed by an eructation of a thin, watery, limpid, or nearly clear and often ropy fluid in considerable quantity. This fluid is generally insipid, but it is sometimes more or less acid. The eructation is for some time repeated frequently, and does not immediately give relief to the pain; but it does so at length, and terminates the attack.

4. I may add to the above, that I have seen this affection more than once in males much below puberty, occurring at any hour of the day when the stomach was empty, and affecting patients with good appetites and rapid digestion. I have seen it also unattended and not preceded by any actual pain at the pit of the stomach, but by slight uneasiness only in that situation; and in more than one case the patient complained of the great coldness of the fluid thus ejected. The pain is quite different from that of cardialgia, or heart-burn, when the fluid brought up is abundant, insipid, ropy, and

colourless; but when it closely resembles cardialgia, the sensation of constriction, with bending forward of the trunk, is not present, and the fluid ejected is often acid, and less abundant than when the pain is of the constrictive character above described. In no case is the disease attended by fever, or by nausea or retchings. The fluid is always regurgitated or eructated by a similar inverted action of the esophagus to that producing rumination. It has appeared to me, during a careful observation of some cases, that the constrictive pain, as well as the ejection of the fluid, partly may be referred to the diaphragm.

5. *Complications.*—Pyrosis may be independent of indigestion, or be attended by rapid digestion; it also may be associated with either of the forms of dyspepsia or with flatulence. It is commonly complicated with costiveness, and often with torpid function of the liver, or even with disease of this viscus. That it is often associated either with organic or with functional disease of the pancreas seems probable. Indeed, it has been long supposed, and by various writers, that the fluid thrown off is merely an excessive discharge of the pancreatic fluid regurgitated into the stomach, and thence into the mouth; but, as Dr. KERR has justly remarked, if this were the case, we should expect the fluid to be mixed with some bile. Besides, it could hardly be expected that so large a quantity of fluid could be furnished by the pancreas in so short a time as during a fit of pyrosis. I am not aware of any instance in which organic disease of the pancreas has followed pyrosis, or in which such disease had taken place in a patient who had been at any previous period the subject of this affection. Dr. SEYMOUR adduces a case in which organic change in the liver followed pyrosis; but the cases which I have observed have not been associated with any organic change, excepting in one instance, although various functional disorders have often been present. It is not unusual, especially in northern countries, where pyrosis is most prevalent, to observe it in the course of pregnancy, and in both married and unmarried females, complicated with leucorrhœa. I have seen it in one instance associated with disease of the ovaria, and frequently in these countries with chronic rheumatism.

6. II. *DIAGNOSIS.*—Pyrosis is readily distinguished from other affections of the stomach by the absence of the usual symptoms of indigestion; by the appearance of the fluid ejected, its clear, colourless, generally insipid nature, and abundant quantity; by the absence of fever, of nausea, or retchings; by the manner in which the fluid is thrown off; by the mere regurgitation without nausea; and frequently by the little inconvenience or general disturbance attending it. The eructations which often accompany cardialgia, or other forms of indigestion, are usually observed during the progress of digestion; the fluid eructated being generally in small quantity, and acid, always discoloured, and often furnishing indications of the indigestible matters. When the fluid of pyrosis is at all acid or acrid, these properties are much less marked than in cardialgia or the allied states of dyspepsia (*see art. INDIGESTION*, § 13, 14); it furnishes no indications of undigested matters, and is thrown up from a stomach which

has digested its contents, and contains nothing but the fluids which it thus ejects. Pyrosis cannot be confounded with simple *gastrodynia*, inasmuch as the former is attended by the copious discharge of a peculiar fluid, without nausea or vomiting, and as this discharge may be abundant although the pain may be very slight, gastrodynia being only a symptom of several gastric diseases. Dr. WEST states, without, however, adducing his authority, that the secretion of true water-brash is composed of water, albumen, and a trace of sodaic salt, with an excess of soda; and that, when it is acid, this property is owing to the muriatic and acetic acids. A recent analysis of the fluids thrown off the stomach has been published; but they do not appear to have been the fluids ejected by pyrosis, as they were mixed with undigested food, and contained much acetic acid. (*Simon's Animal Chemistry*, by DAY, &c., vol. ii., p. 393.)

7. III. *PROGNOSIS.*—Having once taken place, pyrosis is very apt to recur, and it is often very difficult to cure; but I have not met with an instance of it having passed into serious or structural disease, or been attended with danger. I am intimately acquainted with a gentleman who was long subject to this disorder when he was a boy residing in the north of Scotland, and who was afterward frequently attacked by indigestion; but he is now well and strong at an advanced period of life. Persons who are subject to it generally are able to pursue their avocations without much inconvenience; and often continue free from it for a considerable time, without any very obvious cause, and then are attacked, owing either to some error of diet, or exposure to cold and moisture. When the complaint is prolonged, the patient frequently becomes pale, considerably emaciated, and debilitated; and when it is protracted in females, scanty, or difficult, or painful menstruation is a common consequence.

8. IV. *CAUSES.*—A. Pyrosis is more frequent in females than in males, and in the unmarried than in the married. It may occur at any age, after six or seven years, but it is most common after puberty and until far-advanced age. It is so prevalent in some countries as to be considered *endemic* in them, especially in Sweden, Norway, Lapland, Scotland, and the Isles, &c. It has been attributed to the diet used by the natives of these countries—to the use of rye, barley, oats, potatoes, &c., and the want of animal food. It has been supposed that the use of unleavened or unfermented bread may be concerned in producing it. The share that these causes may have in occasioning it can hardly be determined. But it is also prevalent in countries where not only these causes prevail, but others which may concur with them, as the use of dried and smoked meats in considerable quantity, and of dried fish—both the dried meats and the dried fish being preserved without salt, or with very little. Pyrosis is certainly, also, much more frequent in cold and humid climates than in temperate, dry, or warm countries, and among the poor and ill-clothed than among the wealthier classes; although the latter are not exempt in these climates. LANNÆUS states that nearly one half of the population, men and women, living near the mountains in Lapland, were in his time the subject

of this complaint, and that in some it endured through their entire lives.

9. *B. The exciting causes* of pyrosis are chiefly long fasting, errors in diet, tasting savoury articles of food, without partaking of them—cold and humidity, especially when their influence is prolonged, and the warmth of the body is not promoted by exercise; cold applied to the lower extremities; powerful mental emotions; a poor and unwholesome diet; the privations often contingent upon a laborious life in a cold and humid climate; and the want of salutary stimuli, or of wholesome beverages, experienced by persons who are thus circumstanced.

10. *C. The nature* of this complaint has been much discussed. Pyrosis has been viewed as a form of indigestion, and it is probably allied to indigestion in many instances as it occurs in this and other temperate countries; but in northern countries I have seen instances of it attended by powerful and rapid digestion. Dr. PEMBERTON viewed it as a morbidly increased secretion from the stomach, analogous to a diabetic secretion of urine by the kidneys. Some physicians imputed it to obstruction or congestion of the collatitious viscera; and in this light it appears to be viewed by Dr. SEYMOUR. Others have considered it as actually a disease of the pancreas; this organ furnishing the fluid which collects by regurgitation into the stomach, where it causes pain and irritation, followed by its expulsion. The reasons which militate against this opinion have already been noticed (§ 5); and the analysis of the fluid is said to demonstrate that it is not pancreatic, although this is not a sufficient proof, for the pancreatic fluid may be considered just as likely to be altered in quality as in quantity. I once considered it as not improbable that this fluid partly consists of the gastric juice; for, having observed it in persons possessed of powerful digestion, and who live on food requiring strong digestive and assimilative powers, I inferred an abundant secretion of this juice, which would not infrequently be continued to be secreted in excess, especially in circumstances favouring the determination of blood to the digestive viscera, and in the very circumstances by which I have observed a fit of pyrosis to be produced, although there existed no food in the stomach to excite the secretion of the gastric juices; or, in other words, that pyrosis is produced by the continuance of the secretion of the gastric juices after the food taken into the stomach has passed into the duodenum; and that these juices, by irritating or otherwise acting on the stomach, cause the pain attending the disorder, the inverted action of the organ, or the regurgitation by which they are thrown off; the complaint ceasing for a time with the rejection of these juices, and returning only when the exciting causes (§ 8, 9), the nature of the food, or prolonged abstinence from it, or other circumstances which may favour the secretion of these juices, without furnishing food to the stomach on which they may act, are brought into operation. According to this view, the frequent discharge of secretions, so instrumental as they are in the assimilative processes, must necessarily be followed, in protracted cases, by pallor, emaciation, anæmia, and the other complications and consequences mentioned above (§ 5).

11. *V. TREATMENT.*—The indications of cure should be based upon sound views of the nature of a disease; but if these views are not to be found, we must fall back upon the results of experience as far as they may be trusted. If the above opinion that the disease is generally produced by a diet requiring a copious secretion of the gastric juices, but that the attack is excited by the want of that supply of food which is usually furnished to the stomach, or which is required for the quantity of the juices habitually secreted, or secreted in excess under the influence of circumstances, be at all correct, the intentions of cure may be readily devised. Indeed, this view, as well as the treatment, or, rather, the no treatment, founded on it, is not infrequently adopted by persons subject to this complaint; for they generally endeavour to prevent long fasting, rather than to cure the attack by eating, when the pain characterizing an attack has commenced; for if food were attempted to be taken at that time, unless in the slighter fits, it either could not readily pass into the stomach, or it would be rejected along with the fluid which has now occasioned a retrograde action of the stomach. According to this view, a change to a more digestible diet—to food habitually requiring a less abundant secretion of the gastric juices, and avoiding long fasting, will often be sufficient to cure the disease. This, in most places, cannot be even attempted; although a popular recourse to several articles has been recommended as substitutes for change of diet, and to prevent the ill effects of long fasting or of improper food. Thus, opium, spirituous liquors, nuxvomica, canabis Indica, tobacco-smoking and chewing, &c., are severally used in some countries with these intentions, and are more or less efficacious in warding off an attack in persons who are subject to this complaint. These substances, by allaying the morbid irritation of the nerves of the organ, diminish or prevent the excessive secretion of the gastric fluids causing the disorder; but, as long as the diet is persisted in that causes the complaint, the continued use of these substances is required to prevent a recurrence of the disorder, and thus the remedy often becomes as great an evil as the disease itself.

12. Many systematic writers, as well as authors of works on diseases of the digestive organs, appear either to have had no experience of pyrosis, or to have observed it imperfectly, for they have confounded it with cardialgia and other forms of indigestion on the one hand, or with the more common occurrences and states of gastrodynia or gastralgia and of vomiting on the other, and have treated it accordingly. Doubtless there is a more or less close approximation of cases of these affections to each other; still they are distinct. The pain of pyrosis is different from that of cardialgia, or of the more usual painful affections of the stomach termed gastrodynia, or gastralgia, and it may be so slight as to amount only to uneasiness. The matters brought up from the stomach are either not acid or very slightly so, are unmixed with undigested matters, are clear and colourless, are so abundant, and are so peculiar, even as respects their low temperature, as to constitute the chief feature of the complaint. The substances ejected either by eructations

or by retchings, in the ordinary forms of disordered stomach, are generally acrid, acid, or rancid; consist partly of, or contain, undigested articles; and proceed from an unloaded, or a partially loaded, as well as irritated stomach. They are often the products of excess, or are consequent upon errors of diet, or are owing to a weakened or an irritated state of the stomach. But pyrosis occurs only when the stomach is empty, after the usual diet, taken in very moderate or even in insufficient quantity, and the fluids, by which it is chiefly characterized, are regurgitated without nausea or retchings, and always unmixed with undigested matters, as already stated (§ 6).

13 States of disorder quite distinct in themselves, and different in their natures and characters, have thus been confounded with each other; and substances which have been found of service in one or more of these have been recommended as cures for pyrosis, although they are either altogether inappropriate, or only temporarily beneficial. Indeed, unless the chief causes of the disorder be removed—unless many of those who are the subjects of pyrosis live on more nutritious and digestible food, and are better protected from cold and wet than usually fall to their lots—no permanent advantage can be expected from treatment. Most of the remedies which have been prescribed for pyrosis, and have been said to remove it, merely alleviate the attack, but seldom succeed in preventing a recurrence of it. These medicines are generally appropriate in cardialgia, and in most cases of indigestion which are attended by acidity and flatulence, and by the eructation of fluid matters, more or less acid, or acrid, containing undigested, or partially digested substances. But these cases are not cases of pyrosis; and although these medicines are sometimes useful in this latter affection, still they are not permanently beneficial unless they be aided by change of diet, especially by an improved diet. Among the remedies thus recommended, those usually prescribed for the severer forms of indigestion hold prominent places, especially absorbents, as lime-water with milk; soap with small doses of opium; magnesia with various antispasmodics, and narcotics (KANEK, &c.); the oxyde of bismuth, with aloes or henbane (OBER, MARCET, &c.); and ammonia in bitter infusions. As pyrosis was thus generally viewed as a form of indigestion, and not as an affection, caused by the nature of the diet and by the influence of cold and humidity upon the surface and extremities, and independent of defective digestive power, numerous other digestive aids were prescribed for its cure; and among these I may mention, as being sometimes beneficial, the mineral acids, particularly HALLER's or MYNSVICH's sulphuric acid—the acidum sulphuricum aromaticum—the preparations of iron, and the balsams, especially the Peruvian balsam. Bitter almonds, with ammonia and the preparations of angelica root, were much praised by several German writers; and inspissated ox-gall,* with asafetida and soap,

by NIEMANN and others. LINNÆUS recommended nux vomica in powder for the native Laplanders subject to pyrosis; and most probably, if it had been long or often used, in the doses (20 grains) to which he allowed it to be carried, the remedy would have been soon found worse than the disease. (See article POISONS, § 371, *et seq.*) Dr. BAILLIE prescribed a drachm of the tincture of benzoin suspended by mucilage, and Dr. PEMBERTON, ten grains of powdered kino with half a grain of opium every fourth hour at the commencement of the attack; or a bolus, consisting of six grains of alum with two or three grains of the soap and opium pill, the bowels being kept in an open state by rhubarb or other aperients. There can be no doubt of the occasional efficacy of these and of other remedies, especially those prescribed for the more painful forms of dyspepsia (see articles INDIGESTION, § 49, *et seq.*; and STOMACH, *painful affections of*), when they are aided by diet and warm clothing; but without such aids they will often fail. Change to digestible and wholesome food, due promotion of the cutaneous functions, and an open state of the bowels by means of stomachic or tonic aperients, are most deserving confidence, both for the cure and for the prevention of attacks of this complaint, which if otherwise treated will always prove most obstinate.

[Pulverized charcoal, blended with carbonate of magnesia and united with ginger, has been successfully given (since 1812) in various forms of gastralgia and pyrosis, according to Dr. FRANCIS.]

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QUARTAN FEVER. See FEVER, Intermittent.

QUINSY. See THROAT, Affections of.

QUOTIDIAN FEVER. See INTERMITTENT FEVER.

RABIES.—SVNON. *Hydrophobia* (from ὕδωρ, water, and φόβος, dread); *Ydrophobia*, Galen. *Hydrophobia passio*, *Pantaphobia*, *Aquafuga*, Auct. Var. *Rabies canina*, Boerhaave. *Rabies contagiosa*, Parry. *Erethismus hydrophobia*, Young. *Lyssa* (λύσσα); *Lyssa canina*, Good. *Clonus hydrophobia*, Parr. *Cynolyssa*, *Phobodipsia*; *Phrentis latrans*, Auct. *La Rage*, *Hydrophobie*, Fr. *Hundstolheit*, *Hunds-*

* It may be mentioned that the ox-gall was recommended in several places of the first part of this work, and numerous formulae, in which it formed the chief ingredient, were given in the Appendix. These were published in September, 1832; but this medicine was employed by me in practice since 1820, and was not viewed as a novelty, as it had been for centuries prescribed on the Continent; yet has it

recently been paraded as a discovery by some writers in medical journals.

with, *Wasserscheu*, Germ. *Idrofobia*, Ital. *Canine madness*; *Rabidity*; *Hydrophobia*.

CLASSIF. — Class 2d, Nervous Diseases.

Order 3d, Spasmodic Diseases (*Cullen*).

Class 4th, Diseases of the Nervous Function.

Order 3d, Affecting the Muscles

(*Good*). — II. CLASS, III. ORDER (*Author in Preface*).

1. DEFIN. — A disease which is said to occur spontaneously or sporadically in the canine race, and is often communicated by contagion to man and other animals; and is characterized by dread of water and other fluids, by anxiety or distress at the epigastrium, by nervous spasms and choking sensations in the throat, and by paroxysms of uncontrollable impulsive violence (*rabidity*), terminating in death within a few days from the accession of the symptoms.

2. Although the term *Hydrophobia* has been generally applied to this terrible disease, I have preferred that of *Rabies*, or *rabidity*, as being more characteristic of the chief phenomena manifested by it both in man and in the lower animals. The dread of water, or hydrophobia, is a very rare symptom of other diseases, which differ in every respect from the one now defined, and is only one of the phenomena observed in cases of rabies affecting the human subject. There is even reason to believe that it is not a characteristic symptom, or not always present in cases of the disease occurring in several of the lower animals. But this topic more appropriately falls under the diagnosis. In whatever manner the poison communicating the distemper may have originated—whether the malady is perpetuated only by contagion, without the contagious virus being renewed, or generated *de novo* by certain animals, or whether this latter alternative obtain—it propagates itself throughout animals of different species, of different races, and of distinct kingdoms, from the highest to the lowest, and, probably, from the lowest capable of inoculating the poison up to the highest animals; the inoculated animal acquiring a disposition by the development of the malady to inoculate others, and thereby to perpetuate itself. The slight mention which has been made of this disease before the Christian era, and the silence of the Hebrew writers respecting it, have induced some to believe that it is more prevalent in modern times than during periods of remote antiquity. In many places of continental Europe rabies appears so frequently in some of the lower animals, and so destructively as respects the attacks of the rabid animals on man, as to require a closer investigation of several topics connected with it than it has hitherto received.

3. The *Literary History of Rabies* has been investigated by SPRENGEL, BARDSLEY, HOFFMANN, and ADAMS; but although many of the ancient writers, from Homer down to the commencement of the Christian era, made allusions to, rather than special mention of, this malady, CÆLIUS AURELIANUS was the first to describe the symptoms with accuracy. CÆLUS and GALEN concerned themselves more particularly with the prevention and treatment than with the history of the progress of the distemper; yet GALEN attempted to explain the prolonged period which the poison sometimes requires to develop its effects, and which he states to be

occasionally as long as a twelvemonth. The Arabian writers add but little to what may be found in the medical works of the Greeks and Romans. AVICENNA, however, notices the affection of the urinary organs, and the occasional termination of the malady by apoplexy; while his description is more full than those of his predecessors. As to the prevention and treatment of the malady, the ancient writers are as instructive as many recent authors; although that which is really valuable and appropriate is often mixed up with much that is either absurd or irrational; yet not equalling the extreme absurdity and irrationality of some of the doctrines and means of the present day.

4. I. DESCRIPTION. — This disease presents well-marked specific symptoms both in the human subject and in the lower animals; yet these symptoms vary somewhat in different animals. In the domestic dog it assumes two forms, the *sullen* and the *furiosus*; while in the feline race it generally presents only the latter form. In some animals the dread of water is said not to exist, at least at one period of the progress of the malady; while in man it is a very prominent symptom, although it frequently disappears shortly before death. Whether the disease arises only from contagion or inoculation, as supposed by some, or whether it is spontaneously evolved in certain circumstances in the canine, or also in the feline race, and is communicated by these modes from the subject of its spontaneous evolution, as believed in by many, the period of its incubation is generally long, while its course is extremely rapid when it has once declared itself. These are its characteristics in all animals inoculated by the poison producing it; but there are also others which mark the *periods* or *stages* into which it may be divided.

5. (a) *Stage of Incubation; the Latent Period.* — In this, the first stage, the symptoms of disorder may be either wanting or so slight as to escape observation. The wound by which the distemper is usually inoculated, whether dressed or neglected, generally heals up as kindly as similar injuries, if, indeed, not more rapidly than they, leaving a cicatrix which differs in no respect from those usually following such injuries. In some cases, however, pain has been felt in the cicatrix a considerable time after the accident, and in a few a slight fever or a rapid pulse has been remarked to continue from the receipt of the injury to the outbreak of the distemper. The *duration* of this period is seldom shorter than forty days, or longer than two years. Undoubted instances have, however, been adduced by M. TROLLIER, whose experience of this disease has been most extensive, in which the characteristic symptoms appeared as early as the eighth day, and he even quotes instances of their occurrence as early as the day following the injury. That the duration of this period sometimes extends to six or nine months has been satisfactorily proved. Apparently, authentic cases have been adduced of a much longer time. J. HUNTER, R. HAMILTON, and S. BARDSLEY have endeavoured to show that all credible cases on record have occurred before the eighteenth month, while other authors have contended for even a longer period. Dr. URBAN states confidently, that he has known cases to occur as late as twenty months, and

four years after the injury, and similar prolonged periods have been adduced by others. In these the question is, whether the disease has been actually inoculated at a period so far back, or has there occurred a reinoculation at some intervening period? The solution of the doubt as to the possible duration of this period is one of some importance as respects the fears of a person who has sustained this most distressing injury.

6. The circumstances which, in man especially, seem to shorten the duration of this period on the one hand, and to prolong it on the other, have not been fully inquired into. It is not improbable that a small dose of the poison communicated to the wound will take a longer time to produce its effects upon the constitution of the injured person than a stronger or larger dose; that the rapidity of the effect will have some relation to the virulence or quantity of the inoculated poison, and the constitutional powers of the subject. In cases, however, where symptoms of hydrophobia, with spasms, &c., follow immediately or very soon after a bite, a question suggests itself: Are the symptoms actually those of inoculated rabies, or are they merely induced by the nature of the local injury, by the laceration of a nerve, by the puncture of a tendon, or by the fright or mental anxiety consequent upon the accident? This topic requires only to be kept in recollection in relation to this part of the subject: fuller consideration will be given to it in the sequel. The causes which more especially tend to hasten the development of the distemper after inoculation are debility of constitution, previous ill health, the fright experienced at the time, the fear and anxiety afterward entertained, the depressing passions, venereal excesses, exposure to the sun's rays, and injuries received on the cicatrices; while, on the other hand, a vigorous constitution, and absence of all dread, and of all causes of mental depression or of bodily exhaustion, probably either prolong the period of incubation, or successfully resist the influence of the poison, especially when the quantity inoculated has been small.

7. Although the period of incubation has presented no disorder, or the patient has made no complaint of any, still instances are common of more or less disorder being experienced. Still it is doubtful whether or not this disorder is caused by the silent and slow operation of the poison on the economy, or by the mental anxiety caused by the risk in which the patient finds himself placed. I am inclined to impute whatever disorder may appear to the former cause, without, however, underrating the influence of the latter. In a case in which this period was about the duration of seven weeks, and in which but little fear of the result appeared to have been entertained, the patient gradually became more sallow than usual, the eyes more sunk, the pulse somewhat accelerated, more excitable and weaker, and he complained of general debility. In another case, in which this period was of more than four months' duration, the patient continued apparently well until shortly before the accession of the malady, when the *precursory symptoms* became well-marked. In some instances, however, the patients are gloomy, desponding, retiring, and timid or melancholy, the countenance being

anxious, and pale, or sallow, and all the digestive functions impaired.*

8. II. SYMPTOMS.—(b) *The precursory stage and symptoms* more immediately precede the outbreak or development of the malady, and continue for a short period merely. This stage commences with morbid sensibility of, or with pain in, the bitten part, and with alterations in the appearances of the cicatrix, which become painful, tender, tumid, and livid; and, according to Dr. URBAN, surrounded by small phlyctenæ containing a bluish fluid, which fluid he contends is capable of communicating the malady. This physician asserts that, although he has treated about forty cases of rabies, he has not seen the pustules under the tongue described by MAROCHETTI and MAGISTEL; but as he wrote soon after these physicians, it is very probable that he never examined the parts at the period of the appearance of these pustules. We are, however, still insufficiently informed as to these pustules, and especially on their pathological and therapeutical importance and relations.

9. With the accession of changes in the cicatrix, and sometimes even without any very obvious change beyond a greater fulness or itching, an aching pain, resembling that of chronic rheumatism, extends from the seat of injury in the direction of the nerves. If the injury have been received in the hand, it proceeds along the arm to the shoulder and to the muscles of the neck or back; if it have been received in a lower extremity, it extends along the thigh to the hips or loins. Sometimes with this pain the cicatrix becomes more irritable, of a dark livid red, and in rare instances opens up, and discharges a watery or ichorous fluid. Occasionally the pain shoots from the seat of injury to the epigastrium or præcordia, and it is often attended with headache, frequent sighing, oppression at the chest, with short attacks of difficult breathing, and with acceleration or irregularity of the pulse, which is usually soft or weak, occasionally full. The sleep is very

* About 1820, Dr. MAROCHETTI, who had visited the Ukraine, stated, that in that country the formation of vesicles or pustules under the tongue had been remarked during this period, and that the opening and cauterization of these pustules prevented the development of this malady. The matter has not attracted my attention in this country; but M. MAGISTEL, in France, has stated that in 1822, at Boulay, ten persons of both sexes and some sheep were bitten by a rabid dog. The wounds, however, were not cauterized until forty-eight hours from the infliction of the injuries had elapsed. He carefully watched for the appearance of the pustules mentioned by MAROCHETTI, and he observed pustules arise, without occasioning pain or cramping the movements of the tongue. Some of these pustules appeared on the sixth day, others subsequently, and the last on the thirty-second day. He distinguished two species, the *crystalline* and the *opaque*. The former were projecting, rounded, and the size of hemp-seed; they were transparent, and contained a limpid, serous fluid. The latter were flattened, of a circular form, of the size of a lentile, and without transparency. The *crystalline* were seated superficially in the inferior surface of the tongue; the *opaque* penetrated more deeply, and presented, when opened, a small, ulcerated cavity. Almost all these pustules were situated on the sides of the frenum lingue, and on the lateral parts of the inferior surface of the organ. The *crystalline* appeared early in the latent stage, and not in all the persons who were bitten; the *opaque* appeared at a more advanced period, all the bitten exhibiting them. The cauterization of both species was soon followed by perfect cicatrization, and the *decoctum geniste*, recommended also by MAROCHETTI, was perseveringly continued. Five out of the ten were seized with the malady and died. M. MAGISTEL disproves the idea, formerly entertained, that ruminating animals labouring under rabies do not bite. Several sheep, which were bitten and became rabid, endeavoured to bite other sheep which were with them.

disturbed, accompanied with frightful dreams, often concerning the animal that inflicted the injury ; loss of appetite, or nausea, occasionally vomiting ; slight rigours or chills alternating with flushes ; constipation of the bowels, pains in the back and limbs, sunk eyes, with dilatation of the pupils, and sometimes intolerance of light. These symptoms may usher in any acute disease ; but when they occur in a person who has been bitten by any animal they should be viewed with strong suspicion ; and more especially if several of them be conjoined with marked timidity and increased nervous susceptibility and sensibility, with an anxious expression of countenance, with fatigue on slight muscular exertion, and continued lassitude, with unusual depression of the animal spirits and sometimes extreme sadness, with increased acuteness of the intellect and of the senses, with slight cardiac palpitation, and with the changes in the cicatrix. It has been ascertained by several physicians, as well as by myself, that the painful sensations do not extend from the cicatrix in the course of the blood-vessels or absorbents, but in that of the nerves. The absorbent glands are never affected. The duration of this stage varies from two days to three, or four or five, or probably to a longer period in some instances, if the commencement of the symptoms in their slighter or incipient states were ascertained.

10. (c) *The hydrophobic period, or fully developed disease*, is attended by increase of the uneasy sensations, and other symptoms experienced in the cicatrix and extending from it, as well as of the precursory symptoms just enumerated. Added to these, there are often drowsiness, chilliness, frequent sighing, a bloated or tumid state of the face, a peculiar pain or distress referred to the epigastrium ; alternations of chills and flushes of heat ; a sense of constriction at the throat, with stiffness or pain about the root of the tongue and angles of the jaws, extending to the larynx and *pomum Adami* ; the respiration is hurried and loud, and attempts to swallow any thing, especially liquids, are attended by pain and distress, and by spasms of the pharyngeal muscles, causing the forcible ejection of such matters from the mouth. These spasms are accompanied with feelings of distress, with epigastric suffering, and with a state of general spasm and excitement, creating a dread of swallowing fluids, although food and the more solid substances are taken with much less difficulty or distress. The alarm and suffering on attempts to swallow fluids rapidly increase ; and even the idea of making the attempt, and the running and splashing of liquids, occasion the most distressing spasms of the muscles generally, but especially of those of the throat, face, and neck ; followed by sobbings, tremour, forcible respiration, and exhaustion.

11. As the malady proceeds, or about the second day, the above symptoms are more severe, and are attended by dryness of the mouth and throat ; by distressing thirst, and the utmost dread at attempting to quench it ; by flatulent distention of the stomach and bowels ; by flatulent eructations and vomiting of greenish or dark-coloured matters ; by a rapid pulse, pain at the epigastrium, and in the course of the diaphragm ; by restlessness, headache, a peculiar expression of countenance, or that of alarm and

anxiety conjoined ; by contracted brows, staring eyes, with a wild and sparkling appearance ; and by retraction of the angles of the mouth. Pains are experienced in the neck, sometimes extending along the spine, and occasionally shooting under the sternum to the epigastrium. The mouth and tongue are clammy, although a frothy saliva is secreted, and repeatedly and forcibly thrown out. A burning heat and dryness of the fauces and throat are now constant ; and, with the viscid state of the saliva, increase the distress of the patient. The respiration is now hurried, laborious, or loud, and the voice, owing to the dryness of the throat, becomes hoarse ; and all attempts to relieve the dryness and thirst are followed by returns of the spasmodic or convulsive paroxysms, and by signs of alarm and distress. In the advanced state of this stage, the susceptibility and sensibility of the surface are extreme ; a breath of cold air, the slightest touch, a fly settling on the skin, &c., often inducing a return of the spasms. Frequent micturition is experienced, sometimes with priapism ; the splashing of water, the sight of bright objects, the jingling or rattling of glass, hardware, or metallic substances, often reproducing the spasms and general distress, and occasionally also the micturition. All the senses are now morbidly acute, and light and sound become distressing. Yet the mental powers are often undisturbed, or even unusually acute, although they are as frequently slightly disturbed, especially as respects morbid impulses, and the entertaining of suspicions or dislikes of particular persons.

12. The mental disturbance accompanying rabies may be so slight as to escape observation, and is rarely very manifest or prominent, unless during a paroxysm, when it consists of an involuntary impulse to run against any one who is opposite, and of a desire, which the patient states himself to feel, but only momentarily, and for which he expresses his regret in the intervals, of tearing in pieces who and whatever opposes him. This rabid impulse, although only momentary, distresses the patient ; he struggles to suppress it, and it is often strongest against those to whom he is most attached. I have seen it in two cases ; and in one, attended by Mr. DENDY and myself, the patient called out to be held, so that he might not dart upon the person opposite to him. Actual delirium is rarely present, nor is the mental disturbance greater than that now stated ; nor does it often proceed farther than greater loquacity than usual. In a few there are frequent muttering, unconnected talking, and even certain hallucinations or illusions, especially as respects the animal that inflicted the injury ; but the patient answers rationally when addressed. These illusions sometimes excite alarms, and occasionally violent efforts to avoid the objects of them ; but he is readily influenced by the friends around him, although some degree of restraint is often required during the convulsive or rapid paroxysm.*

* The following extract from the history of a case attended by Mr. DENDY and myself will illustrate this advanced period of the disease : "The previous night was passed in a restless manner, with little or no sleep. He still talked rationally during the interval between the fits of violence, and exerted his faculties in praying more than his years (aged twelve) or knowledge promised. He was fully impressed with the idea of dissolution. The pulse

13. The above symptoms may have all been observed by the end of the first day from the appearance of the hydrophobia; but they are more generally observed in the course of thirty-six or forty-eight hours, or by the third day. About this period, the tongue is generally clean, but dry; there is still thirst, and sometimes, also, hunger, which becomes more and more urgent. The heat and dryness of the fauces increase, and the saliva is viscid, adhesive, and, not being swallowed, owing to the distress caused by deglutition, is either forcibly thrown out, or accumulates in the throat and vicinity of the glottis, occasioning the unnatural noise during respiration, which has been fancifully likened to the barking of a dog; or it adheres to and collects about the lips, sometimes producing a frothy appearance. This accumulation of mucus in the throat, together with the distress and strangulating sensation on attempting to swallow, occasions the difficulty of breathing, or the feeling of impending suffocation, often now complained of. Restlessness, tremours, and guttural and general spasms return more frequently, are excited by the slightest causes, and are often attended by a sort of furor, or rabid violence. The sensibility of the surface and senses is extreme, and is painfully excited by the slightest contact or stimulus. The patient dislikes strangers or dreads them; the pulse is now very rapid, small, weak, or irregular; the skin is cool, and the excretions present no very morbid appearances. Vomiting of greenish, dark, and glairy fluid, or bilious matter, often occurs, and is attended by pain at the epigastrium and flatulent distention of the abdomen. During the paroxysms, especially when the spasms affect severely the abdominal muscles, the urine is often passed involuntarily, or without control, and sometimes with erections. The blood taken from a vein at this period presents nothing beyond a somewhat loose coagulum, and a deeper colour than

was fluttering, small, weak, irregular, and about 135 in a minute. The bowels were freely evacuated; the stools were dark. The characteristic symptom, hydrophobia, had entirely disappeared; he drank a considerable quantity of ginger beer without difficulty. The rabid paroxysms were now more frequent and severe, but of very short duration. They sometimes occurred without any exciting cause; but were induced by the mere mention of them, or by whatever excited his dislike, his sensations, or his temper. At our visit this morning, while Dr. COPLAND was making some inquiries respecting the fits of rage at his mother, on whose knee he was then sitting, he sprang forward at Dr. C. by an involuntary and irresistible impulse, which required the strength of his mother to restrain, although he expressed great attachment to Dr. C., and a desire of seeing him frequently. As soon as the momentary paroxysm had subsided, he excused himself very rationally, and stated that his conduct arose from a violent impulse, and a feeling as if he could tear in pieces whatever came in his way, which was beyond the influence of his will to prevent or control. Deglutition was now much less affected, and he felt considerable appetite. He ate bread and cheese, and drank porter in our presence; but the sensibility of the surface was increased. He could not bear the least breath of fresh air; even the touch of a fly caused him distress. He sighed less profoundly, but more frequently, and his timidity and fear of strangers were greater. There was no spasm present, unless during the act of swallowing, and then it was only perceived in the abdominal muscles in a slight degree. The vital energies of the system were much more sunk than yesterday; yet he could still walk across the room, but with an unsteady step. He complained of no pain, but of considerable uneasiness between the shoulders, when he wished the place to be pinched or pressed. The pupils were dilated, but readily contracted from the stimulus of light." He died six hours afterward, when attempting to walk out of the house. (See Mr. DENDY, in *Lond. Med. Repos.*, vol. xviii., p. 296.)

usual. The powers of life either sink suddenly or evince a gradual but rapid depression; the debility characterizing the disease from the commencement quickly passing into exhaustion from the frequent recurrence of the nervous and muscular exacerbations, or spasmodic paroxysms. At length, after one or two violent exacerbations, life is extinguished.

14. In some cases the patient suddenly becomes tranquil, and most of the symptoms subside. The hydrophobia disappears, and he can drink and eat even voraciously. Occasionally the difficulty of swallowing still continues more or less, but the attempt is not attended by the former spasmodic attacks of suffocation, or general spasms. Still the impulsive paroxysms, or attacks of furor, may be as frequent or severe, or more so. The sound of water, of splashings, the jingling of glass, the sight of bright objects, which excited attacks of guttural strangulation and general spasm, often with micturition, no longer distress him. This state of calm occasionally passes into more complete repose, upon waking from which, or from an apparent sleep, he suddenly expires. But more frequently he is carried off in this state of calm by an impulsive paroxysm, or general spasm, extending to the respiratory muscles, or while making some effort. In many cases no calm is observed, but the exacerbations or paroxysms become more violent and frequent, the debility in the intervals more marked, until life is terminated during an exacerbation. In all the cases which I have seen, the surface becomes cool, and dark or lurid, the eyes sunk, the pupils dilated, and the lips and tongue livid or dark before death, and covered by much viscid, thick, or frothy mucus. The eyes, however, retain their brightness. Dr. BARDSLEY states that the muscles remain rigid long after death; but in a case which I saw immediately after dissolution the muscles presented the usual relaxation observed at that period, although the *post-mortem* rigidity followed. The rigidity observed in other cases is probably the continuance of the general spasm, which sometimes terminates existence.

15. Such are the usual symptoms and progress of this advanced stage of the disease. The duration of it may vary from thirty-six hours or from two or three days to five or six; but it is seldom longer than eighty hours after the symptoms are fully developed. Dr. BARDSLEY mentions the more prolonged period of eight or nine days in a few instances; but in these cases the period must have been reckoned from the first appearance of the premonitory symptoms (§ 8), the distemper rarely continuing longer than this latter period from the first manifestation of precursory signs. Individual cases often present phenomena either different from the more common course above described, or in addition to them. In some, severe pains are complained of in the spine, especially the cervical region; in others they are experienced at the epigastrium, and are attended by violent contractions of the abdominal muscles. The sensibility is always increased, and occasionally it is most remarkably great, the slightest touch, polished surfaces, strong light, noises, &c., exciting the paroxysms. The patient often perceives odours and hears sounds which others cannot perceive or hear. MACENNE states that

a patient who was deaf and dumb from birth heard during the paroxysm. The distress experienced about the throat is not accounted for by the appearances, which seldom are more serious than slight vascular turgescence, or redness of the mucous surface.

16. The paroxysms are rather those of spasm than convulsion, or consist chiefly of violent impulsive actions of the muscles, impelled by an uncontrollable volition; and the spasms which are excited by attempts to swallow are accompanied with violent contractions of the abdominal muscles, of the cremasters, and of the sphincters; sometimes with micturition, by priapism, and even by seminal emissions. The pulse is always accelerated, and becomes more and more rapid with the duration of the disease; it varies remarkably in strength, fulness, and regularity; but it is usually from 126 to 150, and very weak, small, and irregular during the last few hours of existence. The breathing is at first loud or convulsive, and attended by profound sighs or sobs, and by fits of strangulation during the paroxysms. In the intermissions it is more easy, but is always accompanied with sighs, which are more frequent, but less profound, as the disease advances. The tongue is sometimes clean, more commonly furred, with a thick, viscid, or frothy saliva, and mucus adhering to its sides. A disposition to bite is certainly present in some cases, although not generally, as in the lower animals, and only occurs in the paroxysms towards the close of the malady. It is generally successfully resisted by the patient. Thirst is constant, but nausea and vomiting are less frequent. The skin is generally cool, unless during the paroxysms, when it becomes warm, or covered by perspiration; it becomes dark or lurid toward the close, and the lips purplish or livid. The bowels are generally costive, and shortly before death both faces and urine are sometimes passed involuntarily. The patient is aware of his condition, of the result, and of the nature of his disease, although they may have been attempted to be concealed from him. *Death* takes place by asphyxia, caused either by complete palsy of the respiratory nerves, or by protracted spasm of the respiratory muscles, according to the degree of pressure or of irritation existing near the origin of these nerves; the respiratory functions being impaired, or otherwise affected, from the first manifestation of the malady; an aggravation of the changes inducing this affection of respiration at last suddenly extinguishing the function.

17. (*d*) *Symptoms of Rabies in the Dog and other Animals*.—It is of importance to know the phenomena characterizing this malady in the lower animals, chiefly as respects the determination of the question as to the existence of rabidity, which the medical man is often called upon to determine. Mr. YOATT, whose experience of the disease in the dog and other animals was greater than that of any other person of whom I have heard, has described the disease as it occurs in them; and from his descriptions, as well as from many such cases which I have seen under his care, the following may be viewed as the usual course of the disease in these animals. One circumstance of great importance, much insisted upon by Mr. YOATT, is that the disease in quadrupeds is not

in some respects similar to that observed in man; and that, while hydrophobia is never, or very rarely, absent in the latter, it is never seen in the former. Hence many think that because the animal has no dread of water, and does not appear wild or furious, he is not rabid; and hence he is allowed to commit farther mischief, and the injured person is prevented from having recourse to proper preventive measures, which may have saved a life which is soon sacrificed to the security caused by ignorance.

18. The first symptoms observed in the dog is a change in the usual habits of this animal; in some there is a disposition to pick up straws, rags, bits of paper, or any small object; others are frequently or constantly licking cold surfaces, as stones, iron, or parts of other dogs with which he is domesticated. In a few instances the dog becomes attached to animals to which he was formerly indifferent, but much more frequently he exhibits a marked antipathy to strange dogs and cats. This antipathy appears very early, and is greatest to cats. The animal becomes lonely, or sullen and irritable; is less eager for or neglects his food; but he is constantly thirsty. There are sometimes redness and watering of the eyes; the expression is suspicious, the look haggard, and the ears and tail droop. The respiration soon afterward becomes difficult, and saliva flows from the mouth, and soon assumes the form of a viscid foam. Vomiting is occasionally observed. The rabid dog now shows great irritability or snappishness, with a disposition to bite other animals, but is still obedient to the voice of his master. He now flies at every creature he meets, but seldom attacking the human subject unless enraged. The holding up of a whip or stick never intimidates the animal, but always excites great fury. Towards the close of the malady the breathing becomes more laborious, and death takes place during strong spasms or convulsions. In no period of the disease, as observed in the lower animals, is there any dread of water. "The dog, although unable to swallow, runs to it with eagerness; and all other quadrupeds in the rabid state, with, perhaps, an occasional exception in the horse, drink with ease and with increased avidity. In most instances, also, there is not the savage fury which persons in general expect to find, but rather a snappish irritability." In many instances, however, the most furiously rabid dog is obedient to his master.

19. III. APPEARANCES AFTER DEATH.—*a*. The body externally presents the usual *post-mortem* rigidity, which is, however, of shorter continuance than after death caused by most other diseases. The depending parts are generally livid, from the accumulation of dark blood in the venous capillaries. The *bitten part* presents nearly a similar state to that observed during the disease, but with less vascularity and lividity. AUTENREITH, BRANDRETH, and SALLIN have seen the nerves communicating with the cicatrix inflamed.—*b*. Of internal parts and organs the *throat* has been most frequently affected; the *fauces*, *pharynx*, and commencement of the *oesophagus* either generally, or in some part more especially, being reddened, injected, covered with lymph, or presenting some sign or other of what has been considered inflamma-

tory irritation or action. These changes partly—but by no means altogether—explain certain phenomena of the malady, and have been noticed in various grades by MORGAGNI, SAUVAGES, RUSH, BADER, DALRUE, FERRIAR, HUNTER, VERDEIL, BAILLIE, LOFTIE, ROSSI, WILLAN, MARCET, RIBES, BARDSLEY, and others. But it should also be stated that these parts have been found hardly or not at all affected by MORGAGNI, ROLFING, STOLL, and myself, although some degree of change in them is most frequently found. The lower portion of the *oesophagus*, the *stomach*, and even the *intestines* have presented slight inflammatory changes in their villous surface, which have been more remarkable in some instances and in divers parts than in others; and in a few cases they have been attended by some degree of ecchymosis. These appearances have been recorded by SAUVAGES, HUNTER, RUSH, LOFTIE, WILLAN, BADER, DALRUE, ROSSI, and others. Very marked inflammatory appearances in the stomach have been remarked by POWELL, BALLINGAL, OLDKNOW, and DUPUYTREN. The *salivary glands* have been stated to be enlarged and vascular by some writers, and to present no alteration by others. In many instances they have not been examined with any intention, and even not at all.

20. *c.* The *respiratory and circulating* organs have, until recently, received only slight notice. M. TROLLET first directed especial, but much too exclusive, attention to these organs. Previously to the appearance of his work, inflammatory appearances had been remarked in the *larynx* by MORGAGNI, BABINGTON, and WATT; in the *trachea* by RUSH and OLDKNOW; and in the *lungs* by MORGAGNI; but these received only a passing notice; and, although not deserving the importance attached to them by M. TROLLET, they serve to explain certain symptoms often attending the malady, and to illustrate the more immediate cause of death. The alterations which have been most remarkable in the respiratory passages and lungs, as observed by PORTAL, MARSHALL, BALLINGAL, TROLLET, FAURE, RIBES, LALOUETTE, myself, and others, and which have been by some considered inflammatory, but incorrectly, are, 1st. Injection or congestion of the capillaries of the bronchial mucous membrane with very dark blood, extending to the trachea and larynx. 2d. The presence of a thick, grayish, viscid, frothy mucus, which covered the respiratory mucous surface, and which in places almost filled the bronchial canals. 3d. Congestion of the lungs, these organs being of a very dark colour, especially posteriorly, and containing black fluid or semi-fluid blood. These changes are certainly more congestive than inflammatory; and certainly the cases I have seen have presented no true symptoms or signs during life, nor appearances after death, which I could consider as actually inflammatory. The *heart* and *pericardium* have presented no other changes than congestion of the auricles and adjoining veins, which have sometimes contained gelatinous clots. The *blood* has almost invariably been very black and fluid; a state more immediately resulting from the mode of death in this disease, namely, by asphyxia consequent either upon paralysis of the respiratory nerves, or upon interruption to the changes produced on the blood during respiration, owing to the accumulation of mucus in the bronchi. These

changes in the blood have been remarked by MORGAGNI, SAUVAGES, and others, who have stated that the blood is early decomposed after death. There can be no doubt, however, of a dark, black, and fluid state of the blood being found after death in every case of rabies, and that it must be assigned to either or to both the causes just mentioned.

21. *d.* The *nervous system* has, in various parts, been found more or less changed, but these changes have neither been always observed, nor have they been the same in different cases; and they certainly have not been observed, even when present, with due precision. As respects the *brain and its membranes*, the most frequently remarked alterations are congestion of the vessels and sinuses with black blood, and slight effusion of serum into the ventricles (MORGAGNI, FERRIAR, MARSHALL, ROSSI, &c.), and within or under the arachnoid; but these changes are usually slight, or almost absent, although more remarkable in some instances. M. TROLLET found them in six of the cases which he examined, and remarked also increased vascularity of the surface of the cerebrum, and congestion of the plexus choroides. In two cases blood was extravasated near the base of the cranium, and in others a plexus of injected vessels surrounded the origins of the optic and pneumo-gastric nerves. Dr. BARDSLEY states, that of five cases which he examined three presented marks of increased vascularity of the brain. In one there was only slight turgescence of the vessels of the pia mater and of the choroid plexus; in another the brain was natural. Other changes have also been remarked within the cranium, as slight softening of the brain in some instances, increased firmness or induration in others, with various other appearances of slighter moment; but these, with other contingent lesions of a chronic nature, are most probably quite unconnected with this malady. BONETUS, VAN SWIETEN, LIEUTAUD, and many others have seen no change of the brain or its membranes—certainly none to account for the symptoms; and I may add, that even the most remarkable alterations presented by these parts are quite insufficient to explain the phenomena, the progress, and termination of the disease.

22. *c.* The *medulla oblongata* and *spinal cord* have received insufficient attention in pathological researches respecting this malady; and it is only in comparatively recent times that these parts have been examined after death from this malady. Congestion in this situation has been found by BREAR, SALIN, SAUNDERS, REID, TROLLET, GOODRICH, OLLIVIER, RIBES, BARDSLEY, and others; but this state is extremely equivocal, is often the result of the mode of death, and of post-mortem fluidity of the blood. Of two cases recorded by Dr. GREGORY and Dr. A. T. THOMSON, one presented no change of these parts of the nervous system; but in the other the spinal cord was remarkably congested, particularly in the cervical and dorsal regions; and the whole of the cellular tissue between the theca vertebralis and parietes of the canal was loaded with suffused blood, which, in several places, lay in black coagula. In a case, also, by M. CLOT, adduced by OLLIVIER, the cellular tissue, in the same situation as in the former case, was very red and infiltrated with blood; the substance, also, of the cervical portion of the cord was in-

tensely inflamed, and contrasted strongly with the whiteness of the dorsal and lumbar portions. In a case mentioned in the *Medico-Chirurgical Review* for 1817, inflammatory appearances were observed in the coverings of the pons Varolii, medulla oblongata, and upper part of the cord. In a case recorded by Dr. BRIGHT, the substance of the inferior portion of the dorsal spinal cord was completely softened; and a similar change in the same part of the cord was found in a case detailed by OLLIVIER. Fluid has also been found in the spinal canal, but it is doubtful whether or no the fluid has been, in quantity or quality, such as to constitute a morbid condition. Dr. BRIGHT mentions the existence, in one case, of small plates of bone in the arachnoid of the spine, a lesion which I have seen connected with increased vascularity of the membranes of the cord in cases of tetanus. MM. DUPUY, BARTHELEMY, and several others have seen inflammatory changes in the medulla oblongata, upper portions of the cord, and their membranes, in the lower animals. LAENNEC and ORFILA have also observed inflammatory appearances in the spinal cord; and in a dissection described by Mr. COPELAND, these appearances existed chiefly at the base of the brain, on the crura cerebra, and tuberculum annulare. M. GENDRIN, however, and some others contend that many cases of this malady present no evidence of disease in the spinal cord or nervous ganglia.

23. It may, however, be remarked, that the precise character and amount of change in the medulla oblongata and spinal cord in this malady have not been sufficiently investigated; that the absence of all lesion in these parts has not been satisfactorily shown; and whether the existing lesion be one of an inflammatory nature, or one interesting the intimate structure of these parts in such a manner as to escape the detection of our unassisted senses, there are strong reasons for inferring that some change actually exists in these situations, although it may not be limited to them, but may extend to the related or associated nerves, and even to the parts supplied from these sources and by these nerves. In a case assiduously attended by Mr. DENDY and myself in 1821, I was induced to examine the state of the larger nervous ganglia, expecting to find inflammatory or other changes in these parts of the nervous system, but they presented no appearances which could be considered as morbid, or could be detected without the aid of the microscope. Since then MAYER and VILETTE have stated that the ganglionic nerves have been seen inflamed by them, but these ganglia are generally very vascular even in health. In the dissection of a case by Dr. BRANDRETH, the par vagum was seen covered by a blush of inflammation, its sheath was injected, and small ramifications of blood-vessels were seen running parallel to the nervous fibrils in the cellular tissue connecting these fibrils. The fourth, fifth, sixth, and seventh cervical nerves were also highly vascular, both in the sheath and between the fibres. Some of these were so much altered as to resemble muscular fibres, being scarlet externally, and pink internally.

24. *f.* The states of the *urinary and sexual organs* have not been examined in most of the dissections which have been recorded. The

only change which I have remarked has been an empty and contracted state of the urinary bladder. BADER says that he found in one case the *uterus* tumid, and both it and the *vagina* very vascular. The abdominal viscera, excepting the changes observed in the villous surface of the stomach and intestines, have presented no alterations which could be imputed to this malady. ASTRUC, MORGAGNI, SAUVAGES, ENAUX, CHAUSSEUR, and ROCHOUX state, that the body of the rabid patient undergoes a more rapid putrefaction than in ordinary circumstances. This may depend upon the debility and nervous exhaustion characterizing the disease, and upon the fluidity of the blood after death, decomposition generally supervening more rapidly when the blood does not undergo the usual coagulation consequent upon dissolution. That the dead body exhales a peculiar fetor is a circumstance noticed by M. ROCHOUX and myself.

25. IV. DIAGNOSIS.—(a) The existence of true rabies—of hydrophobia from the bite of a rabid animal—cannot always be determined with ease; for several of the symptoms of this malady may attend other diseases, or may even be induced by alarm. The dread of water—the hydrophobic characteristic—has had too great importance attached to it in all histories of cases and descriptions of this disease; and many cases have been very loosely detailed, in which this symptom was very prominent, as closely simulating rabies, the resemblance often existing more in the minds of the describers than in the cases themselves. When this symptom occurs in other diseases, which are so characterized by their history and other phenomena as not to be confounded with true rabies, as in the course of fevers, and inflammatory affections of the throat, &c., there can be no difficulty in the diagnosis; but when it occurs in certain states of *hysteria*, or when it is associated with the severe nervous affection consequent upon alarm, then the diagnosis may be most difficult. PINEL states that a soldier was alarmed at midnight by his comrades, and was immediately attacked with convulsions, burning and constriction of the throat, dread of liquids, and expectoration of a copious frothy saliva. “In the morning the horror of fluids and burning pain in the throat were more intense, accompanied with a sense of weight in the head, hurried and irregular respiration, feeble intermittent pulse, and intolerance of light, but without alteration of the intellectual functions. He was certain that he was never bitten by any animal. The symptoms increased, and he died. The examination presented nothing extraordinary. A quantity of mucus only was found in the throat.” A case fully reported in the *Journal des Savans* (August, 1757, p. 81) is referred to by Dr. BENNETT in his able treatise on this malady, and in it all the symptoms of true rabies are said to have existed, and to have terminated fatally, no other cause having been ascertained than fatigue during a hot day. This writer also refers to a case in HUFELAND’s *Journal*, where the person was bitten five weeks before the symptoms appeared, by a dog which was perfectly healthy, and remained so after the individual bitten had died with all the symptoms of rabies. Either these persons had been inoculated with the virus producing rabies at some antecedent period unknown to themselves,

or alarm and other causes are capable, on some rare occasions, and owing to peculiar combinations of causes, of producing a disease which, if the relators of these cases are to be relied upon, is identical in its course and termination with true rabies. The hydrophobic symptom observed in rare instances in hysterical, epileptic, and tetanic attacks; or in the course of exanthematous, febrile, inflammatory, or rheumatic diseases, is associated with very different groups of symptoms from those which either precede or accompany rabies, and, even when it occurs in the worst cases or forms of these maladies, it is not attended by the alarm, the violent spasms and distress extending from the throat to the epigastrium and abdominal muscles generally observed in rabies. The symptomatic hydrophobia, observed in connexion with these or with other maladies, is seldom the prominent or most important part of the disorder, and in many cases where it has been observed an undue importance has been imputed to it.

26. (b) It has been supposed that, when the rabid symptoms follow almost immediately upon or soon after the bite of a rabid animal, the disease is not caused by the inoculation of the virus, but by the mind of the patient. There may be some truth in this opinion; for the influence of the mind in causing, in aggravating, or in developing a malady of this nature, so greatly dreaded by every person, is undoubted in certain circumstances and in some temperaments. The mental influence, strongly or uninterruptedly determined through the medium of the nervous system to a particular organ or part, especially if habitually influenced by acts of volition, will change the sensibility, painfully excite this vital manifestation, and more or less disturb every function it performs in health. But that true rabies will be produced in a bitten person by the influence of the mind, independently of the operation of the inoculated virus, can hardly be demonstrated, and, although not impossible, should not receive complete credence in the present state of our knowledge of the mode of operation of the poison causing the malady. Extreme or prolonged alarm may rapidly develop the action and the effects of the inoculated poison, or may have the same influence upon an inoculation of it on some previous occasion so remote as to have escaped the recollection. I have met with three instances of ladies of a highly nervous temperament, where the mind was most anxiously and distressingly affected by rabies having occurred in their dogs, and by the circumstance of their hands or face having been licked by these favourites shortly before the disease was recognised. The animals were removed to the care of Mr. Youatt, and soon afterward died; and although the mental anxiety and distress of these ladies were extreme for a considerable period, and were attended by slight dread of fluids, still the symptoms were chiefly of a hysterical character, and at no time closely resembled rabies, their duration and the progress of the disorder soon demonstrating the nature of the affection, which subsided with the lapse of time.

27. (c) The early symptoms of rabies may be mistaken for *hypochondriasis* or *melancholia*, especially when the injury has been inflicted long previously, or has been forgotten; but the rapid development of rabies, the precursory symp-

oms (§ 8, *et seq.*), and the painful and convulsive deglutition, with the dread of water, will prevent any mistake. *Hysteria*, however anomalous its symptoms may be, or however closely it may simulate rabies, by the presence of hydrophobia, or of painful and convulsive attempts to swallow, will be distinguished from rabies by the presence of borborygmi, by the globus or clavus hystericus, by the states of the urinary and uterine functions, by the appearance of the salivary secretion, by the vacillations of the mind and temper, and by the history and duration of the case.

28. (d) The resemblance between *tetanus* and rabies is not so close as some writers have believed, especially in their fully developed states. The spasms in the latter are only occasional, continue but for a very short period, and are followed by complete relaxation—are altogether clonic. In the former they are constant, although presenting slight remissions and exacerbations—are tonic and violent. Tetanus commences and is attended with distress, or pain or anxiety under the sternum, with pain and stiffness in the muscles of the jaws, which are gradually fixed, closed, and cannot be opened. Rabies commences with uneasy or painful sensations, extending upward from the seat of injury, with uneasiness at the pharynx and root of the tongue, and the precursory symptoms described above, the mouth opening and shutting readily. Thirst and vomiting are common in the latter, and very rare in the former malady. Hydrophobic symptoms and difficulty of swallowing are very rarely observed in tetanus; while the spasms occurring in rabies as rarely present the form and characters of tetanus, which, moreover, is never accompanied with the extreme sensibility of the surface and of the senses, with the rabid or impulsive paroxysms, and with the symptoms referable to the urinary and genital organs that are characteristic of rabies.

29. V. PROGNOSIS.—The opinion which may be formed as to the ultimate result has reference, 1st. To the disease when the symptoms, precursory or developed, have appeared; and 2d. As to the probable occurrence of the malady after the bite of a rabid animal.—(a) When even the precursory symptoms of rabies make their appearance, and *a fortiori* when the symptoms are more fully developed, are undoubtedly those of rabies, and consequent upon the inoculation of the rabid virus, I doubt the existence of a single well-authenticated case which has been cured. A few instances of recovery have been recorded, but the evidence is not sufficient to convince me that they were ever caused by the inoculation of this poison, and that they were not caused entirely by fright or more continued alarm. The fatal issue of rabies being so general, if not universal, when the malady declares itself, it may be next (b) inquired, What is the prospect of escape furnished to those who are bitten by a rabid animal? The prospect varies remarkably with the species of the animal, with the seat and circumstances of the injury, with the season of the year, with the period after the injury at which prophylactic measures were resorted to, and with the nature and efficiency of these measures.

30. The bite of a rabid wolf, which generally flies at the face, is much more dangerous than

that of a rabid dog. This latter animal most frequently bites through the clothes, which intercept the poison and prevent the inoculation. M. TROLLET states that, at Brives, seventeen persons were bitten by a wolf; of these ten died; and that, of twenty-three persons bit by a she-wolf, thirteen died, although in most of these precautions had been resorted to, but in many after some time had elapsed from the infliction of the injury. "Mr. J. HUNTER has stated, that on one occasion a dog bitten twenty persons, of whom only one was infected with the disease. In 1780, at Senlis, a dog bit fifteen persons, of which three only died of hydrophobia."—(BENNETT.) Of those persons who are bitten by the same animal, the first injured, and those who have been bitten in parts unprotected by clothes, are the most liable to become infected; the saliva, or virus, is most abundant in the first cases, and is intercepted by the clothes in the others. M. JOLLY thinks that the poison of a rabid animal is more dangerous in warm seasons and climates than in cold or temperate periods and countries. Accidents from rabid animals, especially dogs, are certainly more frequent in warm seasons; but it is doubtful whether or no the frequency be owing to the more frequent occurrence of rabies in these animals at these seasons, or to an increased intensity of the poison—most probably to the former circumstance. Wounds which are deep, irregular, sinuous, and bleed but little, are more dangerous than others, inasmuch as the imbibition of the poison from them is more easy or rapid, and the prophylactic measures cannot be so completely employed. When more than one injury or bite has been inflicted, when it is situated on the face, or on the neck, or on the upper regions of the trunk, the danger of infection is increased, and the rabid symptoms are more rapidly developed, the period of incubation being generally shorter. It is obvious, that the longer the period which has elapsed from the infliction of the injury to the employment of preventive measures, the greater are the chances in favour of the inoculation of the disease. As to the efficacy of those measures, more particular notice will be taken in the sequel.

31. VI. Cause.—1. Rabies being the ultimate effects of a specific animal poison, which is capable of acting upon all animals; upon every constitution, temperament, and habit of body, and upon both sexes, at all ages, and in all circumstances of climate, season, and locality, the *predisposing causes* of the malady cannot be determined. As the inoculation of a specific virus, or poison, is the only cause of true rabies, and as the inoculation may or may not have been effected in many cases of persons bitten by rabid animals, it is impossible to state with truth that the inoculation had not taken effect owing to the predisposition of the person who had thus escaped, or that it had produced this fatal disease in consequence of predisposing circumstances in the unhappy sufferer. The most that can be said respecting predisposition is merely inferential. It may be rationally supposed that, when the quantity of the inoculated poison is great, the more rapidly will its effects be developed; that when the vital energies are strong, the longer they will be opposed; and that, when the nervous system

is depressed by fear, anxiety, and other causes, the more rapidly will the malady be produced, and the more likely is the poison, even in a small dose, to take effect.

32. But it may be asked, May not a small dose of the poison, inoculated by the teeth of a rabid animal, whether this poison consist of the saliva, or be conveyed in the saliva, or in the frothy matter in the mouth, or on the teeth and lips of the animal, fail of producing its dire effects in persons possessed of strong constitutional powers; or, in other words, may not a quantity of the poison, which would be productive of the malady in a debilitated, timid, and frightened person, fail in causing it in another person differently or oppositely constituted and circumstanced? The answer may be made, with seeming truth, in the affirmative; but we have no facts which can prove it, although the escape of many persons from the consequences of the bite, under circumstances which tended to prevent the full inoculation, or to diminish the dose, of the poison, and the subsequent imbibition or action of it, appears to favour the inference. The circumstance of the full operation of the poison sometimes not appearing until months, or even years, have elapsed from the time of its inoculation, favours the idea that, in such instances, the dose of the poison is too small or weak, relatively to the powers or state of the constitution, to produce its specific action until some circumstance or change takes place calculated to aid, to determine, or to develop its influence.

33. B. The only *exiting cause* of true rabies in the human species is the inoculation, or application to an abraded or mucous surface, of the virus formed in a rabid animal; this virus either consisting of, or being conveyed in, the frothy saliva and mucus in the mouth, and on the teeth and lips of such animal. This I believe to be the sole cause of rabies. The very few cases of the disease which have been said to have arisen from alarm or other causes have not been sufficiently verified in all their details to warrant the inference that rabies may appear in the human subject from other causes than the one now stated. It cannot be proved that even in these the poison of rabies had not been communicated at some former period, or on some forgotten occasion, taking it as proved that the disease is actually rabies; and certainly most of the instances which have been adduced of spontaneous rabies have not been conclusive as to this origin. We have so many false facts in medicine, that credence should be withheld from those which are opposed to the usual course of events until they are satisfactorily demonstrated. One physician publishes the case of a child that died of rabies caused by the bite of a dog which, he says, was not rabid, as a proof of the spontaneous origin of this malady, or at least of the occurrence of it independently of contagion. But another physician states that the animal which injured the child, and which was said not to be rabid, was actually killed shortly after in circumstances warranting the inference of its rabidity. The desire of publishing whatever appears singular or anomalous, chiefly from an insufficient recognition of all the phenomena, and often from the neglect of many which are most important, gives rise to an accumulation of false

facts, which bewilder even when they fail of misleading.

34. It has been considered that there is no reason wherefore rabies should not occur spontaneously or independently of contagion, because other contagious diseases occur in this manner. But other contagious diseases certainly furnish no very manifest evidence of spontaneous origin on many occasions. Syphilis, smallpox, measles, scarlet fever, &c., present no such occurrences, and are propagated only by a specific poison, although certain seasons and epidemic influences or constitutions favour their prevalence and extension. The same is observed in respect of other contagious and pestilential maladies, which, with those now named, cannot be shown to originate *de novo* on all or any of the occasions of their appearing without contagion being traced as the cause of their appearance. It has likewise been considered that, when rabies occurs almost immediately after the bite of a rabid animal, the disease is actually not the consequence of the inoculation of the poison, but the result of alarm acting upon a susceptible nervous system, and producing a state of disturbance which, in its characters and issue, is identical with true rabies. This is barely possible; but, because the poison requires several days, or even months, to develop its effects in most cases, there appears no reason, nor can this be considered a sufficient reason, against its immediate action in certain circumstances, such as the inoculation of a large dose of it, or unusual susceptibility of the nervous system to the morbid impression caused by it. As respects the few instances in which rabies has been said to have appeared consequent upon fright or other intense causes, and independently of the bite of a rabid animal, either the history and symptoms of the cases are deficient of precision of detail, and of a recognition of all the facts, or the probability of a previous infection, communicated in some way or other, has not been disproved.

35. Much of the misapprehension existing on this subject has arisen from the circumstance of those cases of nervous or other diseases, especially those which have been fatal, and which have presented, with other nervous or spasmodic symptoms, a difficulty of swallowing or a dread of water—a *hydrophobia*—having been denominated cases of hydrophobia, and considered from this single symptom as an identical disease with that produced by the bite of a rabid animal. But to prove their identity, the communication by inoculation of the disease from these spontaneous cases to some lower animal ought to have been tried, but it has never been even attempted. That dread of water, generally depending upon difficulty of swallowing, upon disgust, or some antipathy temporarily entertained, and generally associated with spasms or other nervous symptoms, may assume a prominence in form, character, duration, and termination, to deserve the appellation of hydrophobia, cannot be doubted; and that it may, in certain circumstances of the individual affected, occur directly from the impression of various intense causes, or be associated contingently with other maladies in some period of their course, I readily admit; but I am convinced that either of these occurrences is not so fre-

quent as supposed by some; nor is this hydrophobia, believed by a few writers to be instances of spontaneous rabies, so prominent a characteristic in such cases as it has been made to appear. Viewing, therefore, hydrophobia thus occurring, independently of the contagion of the rabid poison, as a symptom rarely observed in other maladies, and as of doubtful or very rare occurrence as a primary or idiopathic disease, I shall dismiss the consideration of it in connexion with this subject.

36. Believing that rabies—that the disease described above in its fully-developed stage (§ 10, *et seq.*)—never appears in the human subject unless it be communicated by a specific virus or poison, it next remains to be inquired, 1st. What animals thus communicate it? 2d. Do these animals generate or originate it *de novo*, or without previous inoculation or infection? and, 3d. Can the disease be communicated otherwise than by inoculation?—(a) *Certain species of the canine and feline genera* most frequently inoculate the human subject with this poison; the dog, the wolf, the cat, and the fox being the animals which most commonly become rabid and infect others by inoculation. But these other animals may, themselves being infected, communicate the disease to others, provided that they are capable, by the formation of their teeth, jaws, and mouth, of wounding the animals they may attack, and at the same time of applying to the wound the poison which may be present in their mouths or on their teeth. Ruminating and herbiferous animals, owing to the forms of their teeth and jaws, seldom inoculate the disease when they become rabid; and hence many have believed that the secretions of the mouths of these animals are not contagious. But M. BRESCHET has demonstrated that the saliva of these animals, when rabid, will communicate the malady, by inoculation, to other animals. The disease may likewise be transmitted to birds of all kinds; but, owing to the absence, as respects them, of the conditions just mentioned as being necessary to this mode of communication, the individuals belonging to this kingdom of nature can hardly be considered as capable of infecting others, although the possibility of their doing so may be admitted. Of all animals the carnivorous are the most frequent propagators of the malady to others as well as to man; owing chiefly to the circumstance of these animals having preserved the contagion among themselves more especially, by the frequent inoculation of it, and to the form of their teeth, which is the most calculated for inflicting a deep wound, and at the same time for the insertion of the poison—the lacerations, and the other wounds they inflict, not only being very readily poisoned by the fluids of the mouth, but more tenaciously retaining the poison, in consequence of their depth and nature; and of the slight hemorrhage or absence of all hemorrhage characterizing them.

37. The possibility of this malady being communicated by the human subject has been doubted; and experiments have been performed upon dogs with the frothy saliva of rabid persons by VAUGHAN, BABINGTON, GIRAUD, GIRARD, and others, in order to determine this point, but without having succeeded. More recently, however, the question has been decided by MM. MAGEN-

DIE and BRESCHET, who inoculated two dogs with the frothy saliva and mucus issuing from the mouth of a man in the Hôtel Dieu shortly before his death from rabies. One of the dogs became rabid at the end of four weeks, and bit other dogs, which also became rabid. The result of this experiment should render persons cautious, lest the saliva or fluid issuing from the mouth of the rabid human subject should come in contact with some abraded, injured, or mucous surface of another person, as the probability of infection in this way is certainly demonstrated by it; and the statements of MM. ENAUX and CHAUSSIER, that persons have been seized with rabies in consequence of having wiped their lips with napkins or cloths which were soiled with the saliva of a rabid subject or animal, ought not to be viewed as being apocryphal, as they have been by some. CÆLIUS AURELIANUS states, that a person was attacked with this malady after having employed his teeth to undo the fastenings of a mantle worn by a person who had died of it.

38. (b) *Are certain species of the canine and feline races, as the dog, the wolf, &c., capable of generating the malady de novo without previous inoculation or infection, and of communicating it afterward?* The generation of this disease *de novo* by the animals which appear to be most frequently affected by it has been believed in by the great majority of writers, yet I do not consider the matter to be at all determined. Experiments have been made by DUPONTRE, BRESCHET, MAGENDIE, BOURGELAT, and others on dogs and cats, these animals being placed in those circumstances in which they have been said to originate rabies, without this disease having appeared in a single instance among them. This point is most difficult to be determined; and, probably, a just conclusion respecting it will be more likely to be arrived at by careful observation of facts and by extensive experience than by experiments, the failure of which can prove nothing, while what may appear as a conclusive result will admit of cavil. The late Mr. YOVATT, a well-educated, able, and candid observer, and possessed of the greatest experience, remarked to me that he believed that the disease rarely, or perhaps never, originated *de novo*, but in contagion. It has certainly not existed for ages in certain insulated or secluded places, until introduced by inoculation on well-ascertained occasions, while it has never been observed in other places similarly circumstanced. The matter deserves farther investigation, as serving to arrest the propagation of this distressing malady.

39. Those who believe that rabies may occur spontaneously in the dog, wolf, or cat, furnish no precise information on the subject; and it certainly cannot be proved that, when it does appear in one of those animals, it is not the consequence of inoculation or infection at some previous period. The long time often required for the development of the disease after undoubted inoculation, and the possibility of its being communicated otherwise than by inoculation—by the contact of the virus with a mucous surface—serve to render the proof of actual communication by contagion a matter of difficulty. Those who contend for the spontaneous origin of the disease suppose that protracted thirst or hunger, extreme heat, violent excitement or anger, the sexual heat, &c., severally

or variously associated, may develop the malady independently of contagion. Still these are merely suppositions, and are unsupported by positive evidence. M. TROLLIER states that the months of January and August, the coldest and the warmest, furnish the fewest instances of rabies; and that in March and April the greatest number of wolves are rabid; and that in May and September the greater number of dogs. Several writers have contended that the malady is very rare in very hot and very cold climates, while it is most frequent in temperate countries; but much uncertainty, and even obscurity, envelops the subject of the spontaneous origin of this terrible distemper.

40. (c) *Can the disease be communicated otherwise than by the bite of another rabid animal, or by the actual inoculation of the virus?* The bite of the rabid animal is merely the inoculation of the poison, which may be communicated by other modes of inoculation, as shown above. SCHENCK and ZACUTUS LUSITANUS aver that rabies has been caused by wounds from sabres with which dogs had been killed long previously. That the virus of rabies may cause the disease when brought in contact with an abraded surface, or sore, or wound, cannot be doubted; and that it may produce its specific effects, if allowed to remain in contact with a mucous or an absorbing surface or part, has been argued for by some and denied by others. It has been stated that both sheep and cows have been infected with rabies after eating the hay or straw on which rabid dogs, pigs, and other animals have died; and although these and similar occurrences admit of reasonable doubts, they are certainly not impossible. Numerous instances have been recorded of a rabid animal, especially the dog, having licked the lips, the hands, or abraded parts or sores of its master or mistress, and thus communicated the disease; and it has even been stated by PALMARIUS and others that the kiss of a rabid person has actually proved infectious to the saluted individual. That the disease may be thus communicated, especially if there have been any abrasion of the lips, or even if the foam from the mouth of a rabid animal remain in contact with a mucous surface, is extremely probable, although the facts in proof of this mode of infection are few. They are, however, so probable, and are supported by so many analogies, as to deserve attention. The instances which have been recorded—certainly remarkably few—of rabies, or hydrophobia, occurring without any bite, may have been produced by the poison of rabies nevertheless, which had been communicated in some other way than by this mode of inoculation. Authenticated instances have been published (FABRICIUS HILDANUS, HEISTER, PALLETTA, &c.) of the communication of the malady by linen, rags, cloths, &c., which had been torn by, or imbued with the saliva of, rabid animals, and even by the cords with which these animals had been tied. The skins, fleeces, and furs of animals which had retained the saliva or foam that had issued from the mouth at an advanced stage, have even been the media of transmitting the malady, by having brought the virus in contact with an abraded or mucous surface of the infected person. Such occurrences, however, must be remarkably rare; but they are so possible as to render caution necessary whenever

an animal is in any way dealt with in this disease, or even when the existence of the malady is suspected. The statement which has been made, that the breath of a rabid animal at an advanced stage may communicate the malady, rests upon very insufficient evidence. The experiments of MAGENDIE and others show that the blood, milk, flesh, semen, and abdominal secretions of a rabid animal cannot transmit the disease. As to the particular source of the rabid virus, I shall offer some remarks in the sequel.

41. VII. NATURE OF RABIES.—That the poison of rabies is not imbibed by the capillaries of the injured part and carried into the circulation, is shown by the long period which elapses from the inoculation until the disease is developed, and by the characters of the precursory and early symptoms. That it is not absorbed by the lymphatics is evinced by the absence of every sign of irritation of these vessels, or of their associated glands. It is, therefore, to the nervous system that we are compelled to look for the earliest changes consequent upon the inoculation of the virus. As to the pustules said by MARROCHETTI and MAGISTEL (§ 7, *note*) to appear under the tongue from three to fourteen days, and even, in some cases, at a later period, from the inoculation of the virus, their existence may not materially affect the question as to the mode in which the poison affects the constitution. But it is by no means determined that these pustules actually exist; and, even admitting their existence, their pathological relations and nature are unknown. It is possible that they are merely enlarged or obstructed mucous follicles; but, as such merely, their presence ought to be positively determined, and their connexion with rabies investigated in its several relations.

42. The history, progress, and character of the phenomena of rabies are entirely those of a nervous malady of the most intense form. The gradual accession of the symptoms; the altered, and especially the acute, sensibility accompanying them; the readiness with which this sensibility, either of the surface or of the senses, induces, spasmodically and in paroxysms, the reflex actions of the muscles of voluntary motion even independently of volition; the intermittent character of these actions; the marked disorder of the organs influenced by the eighth pair of nerves; and the inordinate susceptibility of the nervous system generally, combine to demonstrate an important change of that part of the nervous system to which sensibility may be especially referred, and which either gives origin to, or is more particularly connected with, the pneumo-gastric nerves. The changes more recently and most generally observed in the medulla oblongata, often extending to various parts of the base of the brain on the one hand, and to the spinal cord on the other, explain the characteristic symptoms now enumerated. It is only in comparatively recent times that our investigations have been directed to this portion of the nervous system in respect of this disease; and in all cases where the inquiry has been duly instituted, some lesion indicative of extreme irritation or vascular excitement in this quarter has been found. Vascular injection, ecchymoses, increased redness or congestion, serous effusion, softening of the cerebral or nervous

structure, &c., have been severally observed after death. M. TROLLET, one of the first observers who directed attention to this part of the nervous system in rabies, states, that the choroid plexus is generally gorged with dark blood; that a small vascular plexus shuts posteriorly the fourth ventricle, and extends to the origin of the eighth pair of nerves and corresponding parts of the brain, which are found redder than usual; that this plexus is generally so deeply injected or coloured as to appear ecchymosed; and that the most remarkable lesions are found in the vicinity of the origins of the optic and pneumo-gastric nerves, which latter perform so important a part in rabies. A due recognition of the several functions of the pneumo-gastric nerves, and of their connexions with the ganglionic nerves both of the thorax and abdomen, will serve to explain most of the phenomena of this malady. Dr. BENNETT justly observes, that a careful perusal of the experiments of Dr. J. REIN (*Edin. Med. and Surg. Journ.*, No. 134), and of other physiologists, will show that congestion of the membranes at the base of the brain, producing more or less pressure on the origins of the eighth pair of nerves, is capable of explaining all the phenomena the disorder presents.

43. Certain of the changes observed after death may be directly referred to violent irritation or vascular excitement in the parts of the nervous system above mentioned; but others are altogether consecutive of these conditions, or are the results of the paralyzed functions of the eighth pair of nerves, induced by the changes in these nerves, or in the vicinity of their origins, while there are also others which depend either upon the mode of death, upon asphyxia either suddenly or gradually induced, or upon cadaveric conditions, or most probably upon both. Several of these consecutive changes, existing either in the digestive canal or in the respiratory passages, have been viewed as the seats and origins of the malady, and, however slight, have had an importance assigned to them to which they are not entitled. Because the pharynx presented appearances of irritation, FOTHERGILL considered rabies as merely a spasmodic angina, and, as this irritation often extended to the larynx and trachea, PARRY viewed these as being chiefly concerned with the pharynx in the production of the malady; subordinate and secondary changes being thus assigned as the conditions constituting the disease. The alterations observed in the lungs, bronchi, and blood are obviously to be referred to the lesions found in the medulla oblongata, base of the brain and vicinity, and to the consequent paralysis or similar disorder of the functions of the pneumo-gastric nerves; the circulation in the lungs and bronchial mucous surface, the secretion from this surface, and the chemical changes in the blood being thereby affected.

44. *What are the humours of the rabid animal which contain the virus perpetuating this malady? And what is the mode in which this virus acts in producing its fatal effects?*—These questions have a real importance as respects the prevention and prophylactic treatment of rabies; but they are beset with difficulties.—(a) As to the first of these, the evidence is rather negative than positive. M. TROLLET, MAGENDIE, and

others have shown, by direct experiment and observation, that neither the blood, nor the flesh, nor the milk, nor the seminal fluid, nor the breath of the enraged animal, is capable of propagating the malady. A similar inference may be arrived at in respect of the secretions and excretions from the abdominal viscera. It is, therefore, to the secretions of the mouth, or to those issuing from this outlet, that we must exclusively look, as the vehicles of, or as the actual poison. The saliva has been viewed from the earliest period of medical history as constituting, or as conveying, this poison; and the mode of communicating the malady has been of itself a strong proof that this is actually the poison. More recently, M. TROLLIET has contended that the saliva possesses no contagious properties, unless it becomes mixed with the frothy matter which is driven out from the bronchi, this latter matter constituting the poison or virus which produces the disease. He rests his opinion upon the absence of any evidence of disease, of enlargement, of inflammation, or of congestion of the salivary glands, upon the morbid changes always existing in the bronchi of the rabid animal, and upon the analogies furnished by other contagious maladies.* Although I consider M. TROLLIET's opinion to be deserving due consideration in all our future investigations, still it cannot be altogether admitted that he has proved the saliva, unmixed with other fluids, to be devoid of the poisonous property, or that he has demonstrated this property to be present in the secretions of the bron-

* As this is a topic of the utmost interest to pathologists, and as the lungs were never viewed, before the researches of M. TROLLIET, as the chief seat (although the consecutive seat only, in my opinion) of morbid appearances in cases of rabies, and as furnishing the poison, the developed effects of which human science has hitherto failed to remove, I here adduce the conclusions at which he arrives: 1st. "The organs of respiration, and the vascular system in the brain, present constant marks of derangement in rabies. The other organs offer nothing that can be rigorously attributed to this malady. 2d. The salivary glands, and the cellular tissue enveloping them, present not the least vestige of inflammation, nor any change in their volume, nor in their colour or texture. 3d. The mucous membrane of the mouth and pharynx are of a pale gray, and are lubricated by a slight moisture: these cavities contain no saliva, nor any frothy matter. 4th. The larynx is rarely inflamed, the trachea more frequently, especially in its inferior portion; the bronchi always. In rabies, the capillaries of the lungs are injected; and this organ is red and congested. The sensibility of this viscus is also greatly increased, a burning heat, pain, and constriction are experienced—pathognomonic signs of inflammatory action. 5th. This inflammatory state of the lungs is specific, and arises from the virus of rabies, as the eruption from the virus of small-pox; the inflammatory appearances being present in different degrees, in different subjects. These appearances are seated in the mucous membrane of the bronchi and trachea; the cellular tissue and serous covering of the lungs being not affected. 6th. A frothy mucus is generally found in the parts inflamed; sometimes in the larynx, oftener in the trachea, towards its lower portion; it is generally found in the bronchi, and it may be squeezed from the air-cells. This frothy matter is a product of the inflamed mucous membrane, and is driven over the lips of the rabid person in the last stage of the disease, when the respiration is quick, forcible, and stertorous. 7th. I consider this frothy matter, thus driven, by the spasmodic expirations, from the air passages over the lips, to be the true vehicle of the virus of rabies, and not the saliva; because the salivary apparatus is not the seat of any pain during the disease, and does not present any lesion after death; because the bronchi are inflamed, are the seat of pain, and furnish a diseased secretion; and because, in all contagious diseases, the virus is produced from the part inflamed; as in gonorrhoea, small-pox, &c. The saliva, therefore, is no more the vehicle of the virus of rabies, than the semen is that of the virus of syphilis."

chial mucous membrane. Nevertheless, his investigations and his views are deserving attention, far beyond what they have hitherto received in this country.

45. (b) *As to the mode in which the rabid virus acts in producing its effects*, we know nothing more than of the operation of other animal poisons, and perhaps even less. The oldest opinion, as to the action of the virus, after being received into a wound, was that it is absorbed and mixed with the circulating fluids, and that it thus produces a general infection of the humours and solids of the body. A subsequent theory ascribed its action to the effects produced in the place injured, and the propagation of this lesion through the whole nervous system. That the fluids and secretions are, generally, infected by this poison is disproven by experiments and observation; and the local effects of the injury bear no proportion to the subsequent constitutional disorder, so as to furnish an argument in favour of the opinion that the disease arises from the propagation of the local impression throughout the rest of the system. It has already been stated that the virus does not act by absorption, because the lymphatics and glands betray no signs of irritation, and because the blood-vessels also present no lesion. It has been supposed that the change locally produced is propagated to the nervous system generally; but granting that this is the case, we are still at a loss to explain the production of a contagious principle, and the limitation of the production of it to a particular part and to a particular secretion. We may, however, readily conceive that the virus affects or irritates the nerves in the part injured, and that this local change in the nerves is propagated, by means of the sensory nerves, to the medulla oblongata, or to parts in its vicinity, to which they are more especially related; that the morbid condition or change thus produced is reflected by means of the nerves arising in these parts of the cerebro-spinal axis, to the respiratory and gastric organs, and more especially by the pneumogastric nerves; and that, in consequence of the change in the influence transmitted by these nerves, the circulation, secretions, and functions generally of these organs are altered. As to the source of the contagious virus, the evidence is inconclusive, although it cannot be doubted that the secretions which are excreted from the mouth actually contain this poison, and that the formation of it takes place at that period of the disease when the functions of those organs, supplied by the pneumogastric nerves, present more or less disturbance. That the succession of changes just stated is followed by the formation of a specific poison—of a secretion capable of perpetuating the malady—is extremely probable; but the exact source or seat of its formation has not been demonstrated satisfactorily. The poison is evidently contained in the fluids issuing from the mouth; but whether it is present in the saliva, or in the mucus secreted by the respiratory passages, as contended for by M. TROLLIET, or in the mucus secreted by the mucous follicles of the mouth, or more or less in all these, is very far from having been determined. Supposing that the poison emanates from one or other of these sources, it still remains to inquire, Does the poison consist in a material, organized, or chemical change in

the secretion constituting the virus; or is the secretion merely the vehicle of a nervous aura or emanation, which is actually the infecting agent, and which is retained by its vehicle only for a short period? If this latter alternative be admitted; and if it follow that the infecting influence is powerful in proportion to the exposure of the injured part to the mouth and teeth of the animal inflicting the injury, and is lost soon after removal of the secretion from its source, several phenomena connected with the propagation of the malady may be thereby explained. HERTWIG's experiments, however, prove the former of these alternatives, namely, that the poison is of a definite character, that it may impregnate various substances, and that it retains its activity for a long period. Possessed of these characters, the circumstance of rabies appearing without the injury or contagion being traced, in rare instances, cannot be a matter of surprise.

46. VIII. PATHOLOGICAL INFERENCES AND REMARKS.—(a) *The spontaneous occurrence of rabies in man*, although believed in by some, and supported by two or three instances loosely detailed and suggesting numerous doubts, rests on no foundation of a satisfactory kind: the fear of water, and the nervous symptoms present in some instances of other diseases, furnishing no approximation in character to this dreadful malady.—(b) *The spontaneous origin of rabies in the dog, wolf, or cat* is a much rarer occurrence than many believe (§ 38, 39). I have stated my reasons for this inference. ZIEGLER, however, assigns such an occurrence to the want of the instinctive degree of nourishment from flesh and blood by these animals, and terms the malady *blood-thirstiness, blut-durst, or flesh-craving, fleischgier*.—(c) *The saliva or secretion issuing from the mouth of the rabid animal conveys or constitutes the poison usually inoculating rabies*. HERTWIG's experiments show that its application to an open wound is not indispensable to the manifestation of its effects, and that it may infect a healthy animal when applied to parts with a thin epidermis, even without abrasion. He farther states that it is inert when applied to the uninjured villous surface of the stomach; but, in opposition to MAGENDIE (§ 40), he considers that his experiments with inoculation prove the blood of the rabid animal to be contagious.—(d) *The time of the development of the malady*, after the inoculation of the virus, varies with the corporeal and mental influences, dose of the poison, &c., from seven or eight days to seven or nine months—usually from four to sixteen weeks. But there are cases on record, which are well authenticated, of years having elapsed from the infliction of the injury until the development of the malady.—(e) *When the disease is developed, the pathognomonic symptoms, in man*, are the severe constriction about the throat, and spasmodic action of the diaphragm, with general spasm or convulsion, upon attempts to take any fluid, and subsequently at the sight of water, or of any glittering object, or the least breath or current of air, or the slightest touch of the surface; * the tenacious

and clammy state of the saliva; and the phrenesied or rabid paroxysms, which become more frequent and marked with the progress of the malady. This phrenesied or rabid state is not continuous, or at all resembles delirium. It is present only during the impulsive or rabid paroxysm, and ceases during the intervals; although attended, towards the close of the malady, in some cases, by certain illusions of sight, it is not accompanied by any mental delusion.* It may be denominated a momentary state of phrensy or madness; but it is neither insanity, nor mania, nor delirium.—(f) According to the observation of several writers, all the *premonitory*, and many of the *advanced, symptoms of rabies appear* after the bite of a rabid animal, and either *suddenly or gradually disappear*.† It is difficult to assign this occurrence to its true cause, or to any single circumstance. The symptoms in these cases may have been developed entirely by the influence of the mind, and have suddenly subsided, or gradually worn themselves out; or the dose of the poison may not have been sufficient for the full development of the malady; or the disease may actually admit of a sudden or gradual arrest under the influence of vital resistance or of medicinal agents. But the occurrences in question are remarkably rare.—(g) *The duration of the disease*, when distinctly formed, generally varies from somewhat less than seventy-four hours to six or seven days. The duration has not been observed to depend upon age, nor even upon strength of constitution. The greater number

of hydrophobia, the muscles of the throat are, at the same time, violently contracted, so that the glottis violently closes, and the attempts of the diaphragm to descend, and of the muscles of the chest to elevate the ribs, are frustrated from moment to moment. The closure of the glottis is, however, not continuous, but alternates with relaxation of the muscles, so that a succession of sobs takes place.

* CHELUS says that there is often an uncontrollable disposition to bite. MR. SOUTH doubts the truth of this, as regards the human subject. I have, however, seen it in two instances; and it is also mentioned as being observed by POWELL and MAGENDIE. According to my own observations, the disposition in man is rather to strike, during the rabid paroxysm, and only to bite when he is restrained forcibly at that period. The remark of MR. H. CLINE, that animals afflicted with this disease are invariably disposed to use their organs of defence—the dog and wolf to bite; the horse to kick and bite, &c., appears quite just. In the cases in which I have observed the rabid paroxysm attended by an impulse to violence, the impulse was momentary, uncontrollable by the patient, and was always regretted and apologized for during the intervals. In all the male cases I have seen, there were almost constant erections, and furious disposition for sexual connexion, especially during the rabid paroxysm—a symptom evidently connected with the seat and nature of the lesion of the cerebro-spinal axis produced in the progress of the malady.

† DR. ELLIOTSON thinks it possible that the symptoms may proceed no farther than the precursory, and that the disease may go off; and he instances the case of two girls, who were bitten in the face by the same dog. "She who was bitten the second became hydrophobic, and died. The other, at exactly the same time, experienced the same premonitory symptoms as her sister, but they all went off." DR. MEAD remarks, that it will not seem strange "that a poison so different in its force, and so alterable by many circumstances, should in some subjects produce symptoms of the same convulsive kind, yet not to such a degree as to hinder deglutition, and these, too, only at particular times. A soldier, of a strong habit of body, came to me, who once a month was seized with a great anxiety, palpitation of the heart, and difficulty of breathing. He had been bitten by a mad dog about six weeks before he began to complain. By bleeding, cold bathing, the powder of lichen with pepper, and volatile medicines, during the oppression, the fits were every month less violent, and at last quite left him" (p. 151).

* DR. ELLIOTSON, whose description is remarkably accurate, justly states that the effect produced by these causes very much resembles that produced upon stepping into a cold bath. A sudden and involuntary inspiration is made, followed by several shorter ones; "and, in cases

of cases, however, terminate on the second, third, and fourth days, and sink either very suddenly or rapidly, and often unexpectedly.—(h) In the dog and other lower animals the dread of water is not observed, nor is it a sign of rabies. As the dog, in the early stage of the disease, has a disposition to lick the hands, face, &c., of persons, this should never be allowed, as I have seen, in several instances, the greatest anxiety and misery experienced for many months by persons who have permitted this filthy and dangerous habit, owing to the circumstance of rabies having appeared in the animal thus indulged.*—(i) The poison of rabies

* Having given above (§ 17, 18) some account of the symptoms of rabies in the dog, much abridged from the description of Mr. YOUTART, I here add that furnished by HERTWIG and CHELIUS. (a) In the furious form of madness, the dog evinces a change from its usual manner, uneasiness, and disposition to change its bed or place of residence, with a desire of licking cold substances. There is loss of appetite, especially for firm food; and disposition to devour straw, wool, leather, sticks, &c. It licks up not only its own, but also other dogs' urine; and sometimes it eats its own dung. It is obstinately covetous, evinces a disposition to bite, especially when excited or threatened, and snaps in the air, as if it would catch flies. There is more particularly a peculiar change in the voice and bark; the voice is hoarse, peevish, and uneasy-sounding; the bark is always followed by a peculiar howl. About the second or third day the eyes become reddened; the skin on the forehead is drawn into wrinkles, giving the animal a fearful appearance; and afterward the eyes become dull and languid. Mr. YOUTART remarks, that the glands concerned in the secretion of saliva become increased in bulk and vascularity. There is at first an increased secretion of saliva; but it soon lessens in quantity, becomes thicker, viscid, adhesive, and glutinous; and it adheres to the corners of the mouth, fauces, and teeth. The dog furiously attempts to detach the saliva with its paws; and if, after a while, it loses its balance in these attempts and tumbles over, there can no longer be any mistake. This is an early symptom, and is owing to the saliva becoming more and more glutinous, irritating the fauces, and threatening suffocation. Mr. YOUTART insists upon the alteration of the sounds uttered by the dog. In every case in which this animal utters any sound during the disease, there is a manifest change of voice which is characteristic. It is generally standing, or occasionally sitting, when the singular sound is uttered. Its muzzle is always elevated. The sound is, at the commencement, a perfect bark, ending abruptly in a singular howl. In some cases this dismal bark and howl is absent, but there is instead a hoarse inward bark, with a characteristic elevation of tone; or there are two or three distinct barks, followed by the peculiar one followed by the howl.

(b) In dumb madness, the dog changes its manner, becomes less lively and watchful, more quiet and melancholy. The lower jaw drops as if paralyzed. The saliva flows down to the ground; and every thing, even fluid, which the animal wishes to swallow drops from its mouth. It can, therefore, bite but little, as the inclination to bite, to run, or even to restlessness, is diminished. All the other symptoms resemble those of furious madness. In the great majority of both furious and dumb madness, there is an evident affection of the lumbar portion of the spinal cord. There is a staggering gait, referable to the hind quarters, and indicating an affection of the lumbar motor nerves. In a few cases it approaches a general paralytic affection. Mr. YOUTART observes, that absence of pain in the bitten part is an almost invariable accompaniment of rabies. The dog will gnaw the flesh completely away from the part. Is this owing to the itching of the part? "However severely a mad dog is beaten, a cry is never forced from it."

(c) Diagnosis.—Care should be taken to distinguish pain in the ear in common canker from rabies in the dog. The ear is, oftener than any other part, bitten by the rabid dog; and when the wound in the ear becomes painful, the dog rubs its ear against every projecting body, scratches it, and tumbles over and over while thus employed. Canker, both internal and external, is a disease of slow growth. The length of time that the animal has thus suffered will usually be a sufficient guide. The dog will often scratch violently enough when it has canker; but will not roll over and over like a football, except it is rabid. The presence of inflammation and ulceration of the internal membrane of the ear in the former, and hardly at all in the latter, notwithstanding the scratching, are deserving of re-

affects primarily and especially the nerves of the part, and extends with various grades of rapidity to the medulla oblongata and origins of the pneumogastric nerves, and then the characteristic symptoms of rabies appear; the whole nervous system ultimately becoming more or less implicated, and the secretions and blood very manifestly changed.—(k) The pathognomonic symptoms and changes observed in rabies more immediately depend upon the lesion of the medulla oblongata and pneumogastric nerves; but how such lesion gives rise to the formation of a specific poison capable of perpetuating itself, does not appear, nor can the mode of production of this poison be shown: in this respect, rabies does not differ from other specifically infectious maladies.—(l) The supposition, lately published, that there is no such specific disease as rabies, and that it is merely the result of mental anxiety, &c., is only one of the absurdities thrown up on the surface of medical doctrine, and hardly deserves mention, and much less serious refutation.

47. IX. TREATMENT.—The treatment of the bite of a rabid animal is, first, to prevent the imbibition or morbid impression of the rabid virus, assuming that inoculation of it has followed, and the consequent infection, or contamination, and other changes; and, secondly, to use reasonable endeavours to arrest the malady, or to ward off death when the symptoms declare themselves. Although a small proportion of those who are bitten by rabid animals may be ultimately seized by the malady, especially when the bites have been inflicted through the clothes, precautionary measures should be taken, nevertheless, in order to prevent the distressing and, it may be said, the incurable effects contingent on these injuries.

48. i. PROPHYLACTIC TREATMENT.—The preventive measures usually had recourse to have generally been employed with the intention either of preventing the imbibition or contaminating impression of the poison, by removing or destroying the injured parts, or of fortifying the system against, or of counteracting the influence of the poison. The former of these intentions are most to be relied upon, for we have no proof of any substance being possessed of the power of counteracting the poison when it has infected the frame, although numerous substances have been supposed to possess this property, owing to the non-appearance of the malady after inoculation of the virus was inferred. But in many instances the disease has not appeared, even after manifest proofs of inoculation, and when no prophylactic measures have been resorted to. Most of the means which have been advised as efficacious in counteracting, or in enabling the system to resist successfully, the operation of the poison, have likewise been employed in various states of combination, or in different modes, when the effects of the poison begin to appear; but however successful they may have proved as prophylactics—doubtful at the best—they have very rarely or never been efficacious when the mal-

mark. Mr. YOUTART states that he has never seen a case of rabies in the dog in less than fourteen days after the bite. The average time he considers to be five or six weeks. In three months he considers the animal tolerably safe. He, however, met with one case after five months, and another after seven months.

ady has declared itself. In noticing the *preventive measures* which have been recommended, I shall take them *in that order which the period at which they may be resorted to will suggest*; these means which may be employed the latest, or in the advanced progress of incubation, being often appropriate, in various associations, when the precursory symptoms appear, if they have not been prescribed previously, and their inefficiency been thereby proved.

49. (a) *Ligatures or cupping-glasses* may be instantly employed, when a recourse to either is possible, until other measures may be adopted, especially excision, escharotics, &c. *Ligatures* have been advised by PERCIVAL and others, and they ought to be instantly applied, immediately above the seat of injury, when this can be done. Where they cannot be applied, *cupping-glasses*, as recommended by CELSUS, and recently by Sir D. BARRY, may be resorted to, the glass being placed so as equally to surround the bitten part. In emergencies of this nature, any glass, or even deep cup, may be thus applied, with the aid of a piece of burning paper, especially after having been dipped in any spirit. Neither ligatures nor cupping-glasses, however, should be trusted to longer than either excision or escharotics may be employed by a competent person.

49. (b) *The complete excision* of the injured part has been next advised, and even amputation of the part, as recommended by Mr. S. COOPER, may be resorted to when a finger or limb has been severely injured or lacerated, or when complete excision of the part is almost impossible or dangerous. Mr. YOUATT, whose experience attaches great importance to his advice, remarks respecting this operation, that it demands greater skill than is supposed, and that every portion of the wound with which the tooth could possibly come in contact must be removed. This is often exceedingly difficult, owing to the situation and direction of the wound. The knife must not enter the wound, or it will be likely itself to be empoisoned, and then the mischief will be increased. Dr. MASSEY was convinced of this risk, when he advised that, "should the knife by chance enter the wound made by the dog's tooth, the operation should be recommenced with a clean knife, otherwise the sound parts will become inoculated." There is no doubt of this risk; and to this cause, as well as to the passage of blood into the bitten wound, to the contamination thereby caused, and to the communication of the contaminated blood with the excised surface, the occurrence of the malady, by no means rare, in cases of excision, is chiefly to be imputed. Aware of the risk arising out of excision, unless completely accomplished without incurring it, many practitioners use the caustic after the knife. Nevertheless, SAUVAGES, SABATIER, CHELUS, SOUTH, and many others, trust chiefly to excision, and consider the objections just stated insufficient to cause the relinquishment of the practice. Mr. SOUTH remarks that, when the disease appears after excision, it is because all the infected part has not been removed. As a portion of the poison may remain, or be dried upon the cutaneous surface immediately surrounding the bitten part, I would advise ablation of this part of the surface with a caustic or alkaline solution just be-

fore excision is performed; and that the recommendation of Mr. H. CLINE to thrust a probe to the deepest part of the injury, and to remove all the soft parts around the probe, without cutting into the wound, so that they may be brought out like a glove-finger on the probe, should be adopted. The subsequent free application of caustic potash, of nitric acid, or of the nitrate of silver, is also advisable, in order to destroy whatever poison may still remain, owing either to the penetration of the knife into the contaminated parts, or to the poisoned part having been not entirely removed.

50. (c) CHELUS states that, when complete excision cannot be done, the *quick cleansing of the wound and its entire vicinity* with water, salt water, water and vinegar, &c., should not be neglected; and that when the wound is small it should be enlarged, and bleeding promoted by cupping-glasses or warm water. The whole he recommends to be thoroughly cauterized by the actual cautery, butter of antimony, caustic ammonia, or caustic potash, or with gunpowder, which is to be exploded. He adds, that the slough is to be soon removed, and a free suppuration is to be kept up for months, by scattering powdered cantharides and by irritating salves. He farther advises mercury to be rubbed in around the wound until pyalism is produced. The same treatment is prescribed by him if the wound, already closed, begins to smart and swell. CHELUS here judiciously associates various measures which have singly found strenuous supporters.

51. (f) Mr. YOUATT recommends, as an *escharotic*, the nitrate of silver, as it may be shaped into so sharp a form as to penetrate as far as the tooth of the animal can have reached, and as it forms a dry eschar. The danger which he attributes to the alkaline caustics, and to nitric acid, of suspending the virus, &c., I believe not to be justly dreaded; for these, in their caustic state, may be considered as capable of destroying the poison, and as completely as the nitrate of silver possibly can. Of the several substances recommended as escharotics little need be said. The one is probably as efficacious as the other; that one which, with efficiency, may be most promptly procured being always preferable.—a. Mr. YOUATT, as just stated, prefers the *nitrate of silver*, and adduces the successful employment of it in hundreds of cases in support of his opinion.—β. ECKER, FERRIAR, PINEL, RUBIÈRA, MARTINET, SOUTH, and others advise the *caustic alkalies*, either the fixed or volatile.—γ. MEINHARD, AGRICOLA, MALDEN, FLAJANI, and numerous more recent writers, recommend the *hydro-chloric* or *nitric acid*, or the *sulphuric* or other concentrated acids.—δ. The application of *butter of antimony* to the part, after enlarging the wound, has found advocates in SABATIER, PINEL, and LE ROUX; and a similar application of *arsenic* or of *arsenical paste*, has been prescribed by AGRICOLA, ZINCKE, ROUEMONT, HARTLES, and others.—ε. FABRICIUS HILDANUS and GÖCKEL advise *boiling oil* to be poured into the enlarged wound, so that it may reach the bottom, and produce a large eschar, followed by free suppuration.—ζ. VALENTIN recommends *combustion* of the part, even after several days, by means of the bark of the *fraxinus* burned in the wound.—η. Recourse to the *actual cautery* has been long and generally

had; but it cannot be considered efficacious unless early employed, and unless it reach the bottom of the wound.

52. (g) After a satisfactory employment of the actual or of the potential cautery, *suppuration of the wound*, kept up for several weeks, according to some, or even for months, according to others, has found numerous supporters; very different means having been used with this intention. CELSUS, GALEN, FABRICIUS HILDANUS, SCHLEGEL, SCHMUCKER, BALDINGER, &c., attach much importance to this measure, while GEISELER, PLANK, O'DONNELL, and the FRANKS believe it to be useless. The means which have been most commonly employed for this purpose are powdered *cantharides*, or the powder of the *melœ proscarabæus*, or *scarabæus magalis* (KEMME, FRITSCH, MULLER, HANNOVER, &c.), *savine*, the diluted *acids*, and strong brine, or a solution of *common salt* (DU HAMEL, PALLINI, AWSITER, &c.). Dr. BENNETT states that AETER, of Vienna, applies a *blister* over the wound, and afterward dresses it with powdered *lytta*, or some stimulating lotion, for six weeks; that he gives also a grain of powdered *lytta* and six grains of *cantharum oculi* internally for six days; and that, "during a period of twenty-seven years, no patient thus treated had been brought back to the hospital under this disease." Dr. HAUSBRAND employs *general bleeding*, and makes deep *scarifications* of the wound, which he washes with *salt* and *water*, after favouring the flow of blood as much as possible. He then applies an ointment of *unguent. basilicum* and *pulv. lytta*, and keeps up a discharge for three months. He also gives *camphor* and *opium* internally during the first three days. "Eleven persons bitten by dogs actually rabid escaped after this treatment." Dr. WENDT, besides keeping up for six weeks *suppuration* of the wound by means of *pulv. lytta*, or other irritating applications, employs *mercury* internally, so as to produce salivation. Of 180 persons thus treated in the Breslau hospital, of whom half had been bitten by dogs actually rabid, or supposed to be so, only two died. The German physicians generally confide in *prolonged suppuration of the wound*; but Mr. YOCART, who has employed the *lunar caustic*, having previously enlarged the wound, when this is necessary, to upward of 400 persons, and four times on himself after bites from dogs decidedly rabid, has not seen the disease appear in one instance.

[In two cases where persons were bitten by a dog decidedly rabid, we kept up suppuration in the wound by pulverized nit. silver for several weeks, with the effect of preventing a subsequent attack. In one case complete excision proved successful, the only case in which we have had an opportunity of trying it.]

53. A. The foregoing measures are those which have been most confided in when adopted immediately or soon after the infliction of the injury. But they have likewise been resorted to during the *latent period*, or at a time more or less remote from the receipt of injury; and various additional means have also been prescribed as prophylactics during this period. Dr. A. T. THOMSON supposes that the virus remains latent in the wound during this period, and produces no marked effect until the state of the constitution favours its action; and hence

he infers that *excision* and other *local measures* may be useful at any time before the precursory symptoms appear. Several facts have been adduced tending to show that this opinion is deserving of attention. REUN has related a case in which "excision was performed thirty-one days after the bite, and even after the hydrophobic symptoms had appeared, and the patient's life was saved." Dr. HARDER relates a case (*Petersburg Med. Trans.*, vol. i., p. 170) in which hydrophobia supervened five months after the bite, and eight weeks after excision; but another excision and cauterization then saved the child. In two weeks the symptoms returned, and a pale and painful excrescence formed in the bottom of the wound. This was excised, and the wound cauterized by nitrate of silver, and recovery took place. Dr. BENNETT states that M. RECAMIER opened the cicatrices, which were tumefied, in a person who had been bitten by a rabid animal fifteen days before, and cauterized them with the crystallized *nitrate of mercury*. Baths and diaphoretics were also employed, and the patient escaped the malady; although another person, who had been bitten by the same animal at the same time, perished of rabies. These cases fully warrant excision and the cautery at any period, even up to the time of the manifestation of the disease, and especially when pain, swelling, itching, or discoloration of the cicatrix appears. At this period more particularly, Dr. SCHLEFFER recommends the nerves going to the part to be divided.

54. (a) Dr. MAROCHETTI, who considers that small pustules form under the tongue during the latent or incubative period (§ 7, *Note*), contends that the true preventive measures consist of *opening and cauterizing these pustules* within twenty-four hours after their formation, of washing the mouth with a decoction of the *genista tinctoria*, and of the patient's drinking a pint and a half of this decoction daily for six weeks. SALVATORI and ROSSI have been said to have succeeded in some cases in which these means were adopted; but M. MAGISTEL states that, of ten cases in which he employed them, five died, although more might have been affected if nothing had been done.

55. (b) During the latent period numerous other means have been advised, in order to counteract the operation of the poison, or to enable the constitution to resist its influence. Many of these means have been recommended with more or less rational intentions, while others have been employed empirically. Of those which have been advised with the former of these intentions, some have been suggested with the view of exciting certain emunctories, and thereby preventing changes affecting the constitution of the blood from taking place; and others have been prescribed with a view of supporting the vital powers, and thereby resisting the action of the virus, and of accomplishing other contingent intentions. Some of these means are both local and constitutional, and others are employed either externally or internally only.

56. (c) *Powdered cantharides*, both locally and internally, have been recommended by WERHOFF, ALIX, WICHMANN, VOGEL, CATANI, SCARAMUCCI, and ROUGEANT for some time after the bite, and even when signs of irritation appear

in the cicatrix; and STAHL and others advise that the use of this substance should be persisted in until the urinary organs are affected, or until bloody urine is produced, a recommendation to which AVICENNA attached importance in respect of the employment of other active diuretics in this malady. The *incloë proscarabarus* was similarly prescribed by SENNERT, SCHROEDER, REIDLIN, and others, both immediately after the injury and during the latent period.

57. (d) *Chlorine, chloric, and hydrochloric acid* have been much used, both locally and internally, to disinfect the wound and to resist the influence of the virus on the frame. MALDEN, AGRICOLA, MEINHARD, and SEMMOLA have attached much importance to these substances; but several instances have been recorded of the appearance of the malady, notwithstanding a prolonged recourse to them. *Arsenical preparations* have likewise been employed in the latent period, both locally and internally, and continued for a considerable time, or according to the quantity prescribed and its effects. HARLES, and others already mentioned, appear to have attached some importance to their use. An infusion of *rue* in *acetic acid*, or the *acetum ruta*, has been employed both locally and internally by WEDEL and others, and continued for several weeks after the injury; the *theriaca* being also taken for a considerable time.

58. (c) There are few preparations whose local or external and internal use have been more frequently recommended than the *mercurial*. The *bi-chloride*, the *chloride*, and the *ointments* have been severally employed both locally or externally and internally in the course of the latent period, and even when the precursory symptoms have appeared; and not only singly, but also in various quantities and combinations. The application of the *sublimato* to the wound was first prescribed by FABRICIUS HILDANUS and PALMARIUS; and, more recently, WEDEKIND, PERCY, and numerous writers in the Memoirs of the Royal Academy of Medicine of Paris for the years 1777, 1778, 1782, and 1783, advised its use, both locally and internally, as a prophylactic. *Calomel* was employed with *sulphuret of antimony*, *camphor*, and various other substances by RANBY, WESTALL, and others, and given in large and frequent doses until the mercurial action appeared. The strong *mercurial ointment* was applied to the wound, also, externally by *friction*, conjoined with *camphor*, by BAUDOT, DESAULT, HANNOVER, POSTAL, and others; and while this application was made to the wound PERCIVAL recommended *cinchona* and *wine* to be taken, in order to promote the nervous energy and the vital resistance of the constitution to the poison. Mercurial frictions, the ointment being mixed with *camphor* and *musk*, were directed over the parotid glands by SCHROEDER and SAULGIER, and continued until salivation followed. Whether used internally or externally, or in any of the combinations just mentioned, or in any other, HOLDEFREUND, COLOMBIER, FALCONER, and many others, advised the preparations of mercury to be persisted in until salivation was produced, and to be continued for a considerable time.

59. (f) *Frictions with olive oil*, while this oil is taken internally so as to preserve a regular state of the secretions and excretions, were

recommended by SHADWELL, SIMS, and FOTHERGILL, and to be continued for a long time after the injury. BAUDOT and others advised that the frictions should be made with a combination of the oil with mercurial ointment and *camphor*, and MEASE and LORTIE with olive oil and the *oleum succini*. WATT recommended a seton to be introduced into the nape of the neck, and the discharge from it to be freely promoted: a suggestion by no means undeserving of adoption, considering the very remarkable changes generally found in the medulla oblongata and its membranes after death, and which the seton may prevent by the revulsive irritation produced by it.

60. (f) *Baths, cold, warm, and medicated*, salt-water baths, the cold affusion, &c., have severally been mentioned by writers, from CÆLUS downward; but they are of doubtful service. Cold salt water bathing and shower baths seem most appropriate, as tending to diminish susceptibility and to invigorate the frame; but I am unacquainted with any satisfactory proofs of their efficacy.

61. (g) Numerous *stimulants, antispasmodics, and tonics* have been advised, with the intention of enabling the nervous system to resist the operation of the rabid virus. *Musk*, in various combinations, and more especially with opium, has been employed by several writers; and *opium*, in numerous forms of association, has been prescribed by many authors. *Myrrh*, with opium, &c., was recommended by SCHLEGEL; *serpentaria*, with the wine of *absinthium*, by VALENTINI; the infusion or decoction of the leaves of the *tarnus baccata*, internally and externally, by ROUGEMONT, ROEMER, and HILDEBRAND; the decoction of *rue*, with that of the *tarnus baccata*, by BLAINE; the powder, or infusion, or the oil of *valerian*, by BOUTEILLE and others; *ammonia* and its various preparations, in large doses, and in various combinations, as with the *anagallis purpurea*, the *oleum* or *spiritus succini*, &c., by ANDRY, RAVENSTEIN, and others; *asafoetida*, with *camphor*, *musk*, and *opium*, by SCHNUCKER, ALIX, and NUGENT; the powder or extract of *nux vomica* by SCHULZE and ROUGEMONT; *phosphorus* in ether by ZINCKE; and *cinchona*, *wine*, *aromatics*, and various tonics, by MEASE, LORTIE, and numerous other writers. The *anagallis flore purpureo* was praised by KÄMPF, ANDRY, and RAVENSTEIN, was given in doses of a scruple every sixth hour, and was prescribed with *ammonia* by some, and both externally and internally by others; but RAYMOND and other writers state that it is inefficacious.*

62. (h) Several *anodyne, narcotic, and sedative* substances have also been tried during the latent period, with the hope of thereby preventing the development of the malady, but with no evidence of such partial success as may hereafter warrant recourse to any of them. These substances, as well as those belonging to the preceding category, were seldom prescribed alone, but were generally conjoined with other internal or external means. Thus *stramonium* was prescribed internally by HARLES,

[* A decoction of the *Scutellaria lateriflora* (*scutellap*) has been highly recommended by some writers in this country as an efficacious prophylactic against this disease, but without any satisfactory evidence in its favour. The same remark will apply to all the other vegetable prophylactics hitherto recommended in this country.—Ed.]

with laurel water, and *belladonna*, by HANNOVER, MUNCH, and HENNING, while suppuration of the wounds was promoted.

63. (i) It is unnecessary to pursue farther the history of means employed in order to prevent the development of the malady after inoculation of its virus is either feared or presumed. An impartial view of all the circumstances involved in cases of injury by rabid animals, discloses various fallacies which weaken the evidence of success which has been imputed to many substances which have been employed as prophylactics; and, while some have been insufficiently tried, and their inefficacy hence not demonstrated, others have been found to fail, upon the success of which much reliance had been previously placed. But it may be asked, should these latter be discarded altogether, or should the facts stated in their favour be discredited because they have been found to fail in one, two, or even in a few instances? The answer I would suggest is, that they ought not to be discarded unless in favour of means which promise a more certain success; for if they be relinquished for these reasons, then with equal reason should all diseases be left to the unaided efforts of nature, inasmuch as no unvarying plan of cure, or no single remedy is efficacious in all cases of any specific malady; and, as regards the prevention of rabies, means which often have proved efficacious in respect of some states of constitution, or against certain grades of infection, may nevertheless fail in other circumstances, either of constitution or of inoculation.

64. ii. CURATIVE TREATMENT?—HOWEVER doubtful, or even hopeless, the success to be derived from treatment when the malady has declared itself, nevertheless the attempt to cure the patient should be rationally made. Instances of recovery from the developed disease are so few as to induce many to believe that they were not really cases of this disease, but of some other affection, in which dread of water was a prominent symptom. Nevertheless, in a few cases of recovery—certainly very few—the evidences as to the actual existence of true rabies admits not of doubt.—(a) In most, if not in all of these, *blood-letting*, carried to the utmost extent, was the remedy to which recovery was chiefly imputed—a treatment advised by BOERHAAVE, MEAD, FOTHERGILL, FERRIAR, MEASE, NUGENT, HARTLEY, RUSH, WOLLASTON, and others. I have referred to the published cases by HARTLEY, PETERS, INNES, TYMON, BURTON, SHOOLBRED, WYNN, VOGELSCANG, and DU HEAUME, in which very copious blood-letting was employed with success. This treatment has certainly been resorted to by many physicians without success; but I believe that in many instances it has not been carried sufficiently far, or has not been resorted to at an early enough stage of the declared malady. I think that these causes of failure are manifest in the cases detailed by Dr. ALBERS, of Bremen, TRÖLLIET, and by others; and that the opinion expressed by Mr. S. COOPER, and by Dr. J. L. BARDSLEY, as to the successful cases not having been instances of true rabies, is not correct, as an attentive perusal of the details of these cases convinces me that they were actually what they professed to be. BERGER, one of the earliest writers who recommended blood-let-

ting, advised that the blood should be taken from the frontal veins; and WEDEL that it ought to be drawn from the sublingual veins. In the vicinity of BRESLAU, in 1719, a cow, the subject of rabies, was cured by an enormous venesection. The case of recovery recorded by Dr. BURTON was treated by the abstraction of 122 ounces of blood within four days, and by calomel and opium. In the much earlier instance recorded by Mr. HARTLEY about 120 ounces were taken, and the cold bath frequently resorted to; a similar treatment, with the addition of opiates and sudorifics, having been resorted to successfully by HILLARY. In Mr. TYMON'S case, very copious blood-letting was accompanied with large and frequent doses of opium, with calomel, JAMES'S powder, and mercurial inunction. Dr. SHOOLBRED, finding immediate relief to follow a very large venesection, trusted to this agent chiefly. In Dr. DU HEAUME'S case profuse blood-letting allayed the fully-developed symptoms, and draughts, with digitalis, hydrocyanic acid, and morphia, were given, and a drachm of the strong mercurial ointment was rubbed into his legs night and morning. Dr. VOGELSCANG, after insisting upon blood-letting as the remedy alone to be confided in, shows that it should be resorted to as early as the malady declares itself, and that it ought to be carried at first to the greatest length consistent with the immediate safety of the patient. Dr. SHOOLBRED'S recommendation is to a similar effect; but he advises that the venesection should be with a large orifice, in order that full syncope should follow.

65. It does not appear that the very large doses of opium, the calomel and mercurial ointment, the cold baths, or the diaphoretics prescribed in several of the successful cases in which large blood-lettings were practised, had much to do with the recovery; inasmuch as these means had, on numerous occasions, been employed to a very great extent without any benefit. Probably, however, the mercurials, the consequent salivation, and copious diaphoresis, produced some service, or aided in preventing the recurrence of the rabid paroxysms. That blood-letting is a rational method of treating this malady is not only proved by its recorded success, but also evinced by the inflammatory or congestive changes found after death in the medulla oblongata, lungs, and brain (§ 20-23).

66. B. Other *cracua*ts, besides blood-letting, have been employed, but with doubtful results.—(a) *Emetics* often repeated were recommended by MASSALIEN, ROUGEANT, SATTERLY, and others; the antimonial emetics, conjoined with camphor, musk, &c., being preferred, with the view of producing also free diaphoresis. How far they may be of service I am unable to state; but the occasional imperfect retchings or vomiting, and the state of the alvine evacuations, indicate the propriety of an early recourse to them, or as soon as the hydrophobic period declares itself.

67. (b) *Purgatives*, after blood-letting and emetics have been resorted to, have been advised by comparatively few writers; but I agree with the few who approve of their exhibition that the chologogue purgatives are required, more especially calomel, or the corrosive sublimate, or the turbith mineral, aided by purgative enemata. Most of the writers who have

advised these latter preparations have entertained the intention of producing *salivation* by them as well as a free evacuation of bile, and have therefore aided this latter operation by the inunction of strong mercurial ointment, and by conjoining them with antimonials, or with camphor, or various other remedies, according to the progress which the disease had made. These medicines have been much employed as prophylactics (§ 58); and when thus resorted to, it is difficult to form a correct estimate of the amount of benefit derived from them; but when the hydrophobic stage has supervened, there is very slight evidence of decided advantage having been derived from them, although, in one or two instances on record, success even in this stage has been imputed to them.

68. (c) *Profuse diaphoresis* has been said to have proved successful when early procured and perseveringly promoted. It is most difficult, however, to produce the effect in a sufficient degree by internal medicines, unless they are promoted by the vapour bath, or by heated air. This practice has nevertheless been sanctioned by GÖCKEL, VATER, WALDSCHMIDT, PAULLINI, HILLARY, RICHTER, and others; but I doubt that it has been employed in so decided a manner as to test sufficiently its effects upon the malady.

69. C. The *sedatives, narcotics, and anodynes*, usually prescribed in medical practice, often have been employed as soon as the hydrophobic symptoms have appeared, but scarcely even with a palliative influence.—(a) Of the several *sedatives* which have been suggested, the *cold affusion, prolonged shower baths, or submersion and cold baths*, are the most energetic. They have been recommended by RANBY, HARRIS, RUSSEL, WARD, and others, but upon no evidence of their efficacy; while FOTHERGILL, DICKSON, WALDSCHMIDT, and many other writers, have considered them worse than useless. The same contradictory opinions have been emitted in respect of *warm*, and variously *medicated, and alkaline baths*, which have been advised from theoretical views rather than from any experience of their influence on this malady. In most of the instances, however, in which I find any record of the manner of employing these baths, they appear not to have received a satisfactory trial, and not to have been persisted in, or repeated, so as to produce a copious and prolonged sweat, or to an extent equal to that suggested above (§ 68). Of other sedatives, *digitalis, hydrocyanic acid*, and the *dilute of lead* are the most deserving of notice. *Digitalis* was suggested by Dr. PERCIVAL, and several instances in which it has been given without any marked effect have been recorded. No advantage can be reasonably expected from it unless it be prescribed promptly, and in nearly poisonous doses. *Hydrocyanic acid* was given by Dr. A. T. THOMSON, but with little or no benefit. The remark just offered respecting *digitalis* is even more applicable to this acid when prescribed for rabies; and if it should ever again be given in the developed malady, I would advise it to be tried in the largest dose compatible with the continuance of life; and to be followed, during its sedative action, by the affusion of cold water over the head and occiput. I may add, that *laurel-water* was recommended with belladonna by HECKER and SCHWA-

BISCHER in the developed state of the disease, but it does not appear that the recommendation proceeded from any sufficient experience of advantage from them. The *acetate of lead*, advised by HEGEWISCH, and the *infusion of tobacco*, as an injection, prescribed by Mr. SAWREY, belong to this category, and hitherto no evidence has been produced in their favour.

70. (b) Of *anodynes and narcotics, opium* and its various preparations and salts—the *acetate and muriate of morphia*—have been most employed; but, although severally prescribed in remarkably large and frequently repeated doses—although as much as 200 grains of opium have been given within twelve hours, no benefit was derived. Mr. WARD advised opiate frictions, and Dr. BOOTH the injection of a solution of the acetate of morphia into the cephalic vein. This latter measure was practised by Drs. BRANDRETH and BARDLEY without any advantage. The preparations of opium and of morphia have been given in all combinations and forms—with camphor, with musk, with myrrh, with ammonia, with valerian, &c.—by the mouth and in enemata, but with no benefit when confided in as the chief means of cure, and only with equivocal advantage when prescribed after large bleedings.—*Belladonna* has been recommended not only as a prophylactic, but also as a cure, by MUNCH, HENNING, HANNOVER, and others already mentioned, aided by division of the nerves going to the cicatrix, or by reopening the cicatrix and procuring a copious discharge from it; and by combining the belladonna with the substances just enumerated. But there is no evidence of success having followed a recourse to this medicine. The same remark is equally applicable to *stramonium*, which was suggested by HARLES to be given in laurel-water; and *conium* is equally inefficient. More recently the tincture, infusion, or extract of the Indian hemp—*canabis Indica*—has been recommended, but I have not heard of any instance of success from the use of this intoxicating substance. Indeed, when the changes found after death are considered, no advantage can be rationally expected from any one of the anodynes or narcotics, when trusted in chiefly, or given in excessively large doses. It is extremely probable that *ether, chloroform*, and other substances productive of insensibility when administered by inhalation, will receive an early trial in this malady; but, for the reason just assigned, no sanguine hopes of success from them can be entertained. Nevertheless, "*Anceps remedium melius est quam nullum*;" and the remedies of this class may be productive of some benefit, either when inhaled or taken internally, or when administered externally or locally. The local application, also, of these anodynes may be of use, both in the pre-monitory stage and in the advanced course of the malady.

71. D. The most powerful *antispasmodics and stimulants* have been advised, and often employed, but with no proof of advantage having been derived from any of them.—(a) The *ethers, musk, camphor, ammonia, castor, asafoetida, turpentine, valerian*, &c., have severally received satisfactory trials, and their want of efficacy in this malady has been sufficiently demonstrated, both when given alone or in conjunction with other medicines, in which latter form they have

been most commonly prescribed, more especially with *opium*, or with *belladonna*, or other narcotics, as mentioned by MEASE, BUCHOLZ, NUGENT, and many others. And these medicines have not only been administered by the mouth, but also in enemata, and in various combinations. *Ether* was thus given with *opium* by MEASE; with *phosphorus* by ZINCKE; with the succinated spirit of ammonia, with camphor, &c., by several other physicians. *Musk* has been exhibited in similar modes and combinations—with *opium*, *belladonna*, camphor, &c.; and with *cinnabar*, *creta*, and *opium*, forming the pulvis Cobbii or Tunguinensis; but there is no sufficient evidence of its efficacy. In a case which I attended with Mr. DENDY, the spirit of *turpentine* received for the first time a sufficient trial—a trial demonstrative of its want of efficacy in this malady.—(b) *Electricity* and *galvanism* were recommended by ROSSI and ALDINI, but no permanent benefit was derived from them. The *nitrous oxide gas* was administered by Dr. BARDSEY with little effect.

72. *E. Tonics* of various kinds have also been tried, but with no marked benefit. *Nux vomica* was given by ROUGEON and SCHULZE, and *strychnia* by Dr. BARDSEY. The *mineral acids*, more especially the *hydrochloric*, have been recommended by MEINHARD, AGRICOLA, MALDEN, ANCELLI, BRUGNATELLI, and others; and, probably after bleeding, the *chlorate of potash* and the *chloric ether* are deserving a trial. The *mineral salts*, especially the nitrate of *silver*, the preparations of *zinc*, the muriated tincture and other preparations of *iron*, have likewise been prescribed, the last by Dr. ELLIOTSON, BRIGHT, and others. The several *vegetable tonics*, especially the *cinchona* and *cascarilla* barks, *sulphate of quina*, &c., have also been suggested, variously combined, and aided by other means, as wine, aromatics, antispasmodics, &c.; but, although MEASE, LOFFIE, and others have conceived that advantage might be derived from this class of medicines, especially when thus associated, or combined with anodynes or narcotics, no satisfactory evidence that benefit has been derived from them, when the disease is developed, has hitherto been furnished. Dr. SEMMOLA has insisted upon the employment of *chlorine*, both internally and externally, as a prophylactic and as a means of cure.

73. *F. Diuretics* were recommended for rabies by AVICENNA; but STAHL considered that no advantage could be derived from them unless they are given in so large doses and so frequently as to produce bloody urine; and with this view cantharides and the meloe proscarabæus have been prescribed by numerous writers, even since the empirical reputation of the latter in rabies has been shown to be, like all other nostrums, without any foundation.

74. *G. Tracheotomy* was advised to be performed by Drs. RUSH and PHYSIC in America, and recently by Mr. MAYO, with the view of averting death as long as possible, believing that this issue was more immediately produced by spasm of the laryngeal muscles; but it is doubtful whether or no spasm of these muscles is more concerned in producing this result than spasm, or even than paralysis, of other muscles or parts.

[In a recent conversation (Nov. 23, 1819) with Dr. MARSHALL HALL, he expressed the de-

cided opinion that death in hydrophobia resulted from suffocation produced by spasm of the laryngeal muscles, and that the operation of tracheotomy would prove more successful than any other treatment. Experiments hitherto have not been sufficiently numerous to establish its value as a remedial resource.]

75. *H. M. MAGENDIE*, believing that the fluid parts of the blood were diminished by the inability of the patient to swallow fluids, and by the continued transpiration from the surfaces, injected a pint of water, of the temperature of 30° of REAUMUR, into the veins of a man in an advanced stage of rabies. The patient immediately became tranquil, and his pulse, in twenty minutes, fell from about 150 to 80. The spasms ceased, and he drank a glass of water. He continued to improve until the fifth day, when abscesses, primary and secondary, appeared, in consequence of portions of lancets, which had broken during attempts to bleed him in the feet during the paroxysm, having remained in the wounds. He died early on the ninth day.—(*Journ. de Physiol.*, t. iii., p. 386.)

76. In a malady so little under the control of medical treatment as this confessedly is, reliance cannot reasonably be placed on any single remedy; and hence various means have been often employed, coetaneously or successively, to arrest its progress, or to combat its more distressing symptoms. Numerous combinations of the medicines noticed above, either as prophylactics or as curative agents, have been advised by writers, but advised rather as suitable means for trial than recommended from satisfactory, or even from any experience of their efficacy.

77. (a) B. D. MAUCHART long ago directed blood-letting from the arm of the side in which the injury was inflicted, and a quantity of blood to be taken great in proportion to the time which had elapsed from the infliction of it. If the patient had become melancholic, or if any of the symptoms of the invasion of the malady existed, he ordered the blood-letting to be carried to the production of full syncope. He next ordered the cicatrix to be scarified and the bleeding from it to be encouraged; afterward the mithridate, rue, theriac, &c., to be constantly applied to it, and these and similar substances to be taken internally. He farther directed a copious diaphoresis to be kept up, and prescribed the same or similar means both to prevent the malady and to cure it when it appeared, success having been said to follow this plan even where the disease was fully developed. It would be impossible for me to notice within reasonable limits, other associated means which have been suggested by authors. The reader will find most of them in the numerous works and papers referred to in the sequel; and he will farther observe that substances confidently recommended, either empirically or by professional credit, as most efficacious remedies in this malady, have, after a time, altogether lost their reputation, not merely from having been displaced from public or medical favour by newer means, but because they have been found totally inefficacious when employed.

78. (b) The uncertain or fluctuating views as to the pathology of rabies have tended not only to render equally uncertain the plans and

means of treatment, but also to increase the number of substances advised as specifics with the utmost confidence which ignorance imparts to empirical means. As certain contagious maladies have been cured by medicines viewed as specific means, or such as may be depended upon for the removal of these maladies, so has it been expected that rabies was to be cured by some particular remedy which, if once found out, might be proclaimed as the true panacea. Hence various substances have been from time to time thus dignified, and enjoyed a short-lived popularity. At a time when credulity was not limited to a few individuals, but extended to scientific and corporate bodies, or, rather, when individuals were so generally credulous as to impart this character to the societies which they constituted, certain substances received a reputation from this weakness of the human mind, and at a time when it was most implicitly believed by all physicians from Oxford and Cambridge, but by themselves only, that all learning and knowledge were concentrated in themselves alone, the ash-coloured liverwort was dignified by these physicians with the name of the *Pulex antilyssus*. Subsequently other empirical remedies have thrown the college nostrum in the shade, and the virus inoculated by the bite of a viper, the guano-juice, the *Scutellaria laterifolia*, the *Alysia Plantago*, the *Ophiorkiza mungos*, the *Genista tinctoria*, the *Thalictrum flavum* and *angustifolium*, the *Delphinium consolida*, the *Anagallis purpurea* [Mikania Guaco], phosphorated ether or phosphorated water [common salt locally applied], and numerous other substances, have, in different countries and at successive periods, enjoyed their undeserved and short-lived reputations, and sunk into congenial oblivion. It may be added, for the information of those who take delight in empirical remedies, that in almost every town, in every country, may be found some old man or old woman who rejoices himself or herself, or knowingly deceives the neighbours and all the credulous within reach, in all ranks, with the professed possession of a specific against rabies; and that these specifics, according to the amount of patronage conferred upon them, have at different times enjoyed a reputation, which was overturned only after numerous proofs of their want of efficacy. The Ormskirk powder and the pulvis Tunguensis are sufficient illustrations of the popular faith in vaunted but worthless specifics, and the credulous confidence they inspired. Numerous recent deceptions, absurdities, and fooleries—deceptions on so large a scale as to comprise the whole range of disease—have thrown these and other absurdities into the shade, and have proved humiliating illustrations of human nature, demonstrative of the extent to which knavish pretension, with a designing sacrifice of human life to selfish acquisition on the one hand, and credulous patronage on the other, lower the just estimate of moral and intellectual endowment, and sink the general standard of common sense and sagacity, as manifested throughout the community, from the highest places, through all ranks, classes, and grades, down to the lowest sinks of wretchedness.

79. *I. Treatment advised by the Author.*—After the review which I have now taken of the treatment which has been recommended for the cure

of rabies in the earlier as well as in the more advanced stages of the developed malady, and reflecting upon what I have myself observed, I may be permitted to state the means in which I am disposed to place reliance when the disease has declared itself: *Bleedings* from the arm to syncope, or large *cupplings* on the nape of the neck, repeated, or carried as far as the habit of body and circumstances of the case will permit, have a greater amount of evidence in their favour than other remedies, and are moreover more consistent with the lesions observed after death. After bleeding, the nerves proceeding to the cicatrix may be divided, and the cicatrix itself laid freely open, suppuration from it being as speedily and freely produced as possible. Immediately upon opening the cicatrix, &c., a free perspiration should be procured and kept up by a hot-air bath, for which the materials are always at hand—namely, blankets and a lamp—or by a vapour bath. In other respects the treatment must depend much on circumstances, and on the predominance or urgency of particular symptoms, for which emetics, mercurials, purgatives, enemata, anodynes, narcotics, antispasmodics, stimulants, tonics, &c., may be employed according to the procession and severity of the morbid phenomena.

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RECTUM AND ANUS, DISEASES OF THE.—

CLASSIF.—GENERAL AND SPECIAL PATHOLOGY.

1. Disease is rarely limited to either the one or the other of those parts, but commonly extends to both when originating in either. Affections of the rectum and anus, whether functional or structural, cannot be satisfactorily understood unless the *structure*, *functions*, and *sympathies* of these parts are duly considered.—(a.) As respects *structure*, the fully developed state of the mucous membrane, of the connecting cellular tissue, and of the muscular coats of the intestinal outlet; the numerous mucous follicles with which this part is provided; the connexions of the veins of the rectum and anus with the mesenteric and portal veins, and of the nerves with the ganglial and spinal; the plicated state of the internal surface, admitting of great distention when accumulations of faeces or of flatus take place in the rectum; the folds of mucous membrane, both transverse (*transverse valves*—*rectal valves* of Houstox) and longitudinal, existing in the internal surface, and the development of these folds during irritation or contraction of the bowel; the liability to congestion of the congeries of veins of the rectum and anus from irritation of the mucous surface, or from interrupted circulation through the mesenteric and portal veins, or from certain positions; the interposition of, and the support furnished by adipose matter; the various alterations of sensibility, and the numerous sympathies, in which nervous and vascular connexions involve the rectum and anus, constitute an assemblage of circumstances which, individually and collectively, re-

quire due consideration in all our investigations into the nature and treatment of the affections to which these parts are liable.

2. (*b*) The *functions* of the rectum and anus are not confined merely to the giving exit to the contents of the bowels. The rectum allows, in some degree, the faeces to accumulate within it, until opportunity and the consequent irritation and distention admit of their expulsion; and on frequent occasions, when want or neglect of such opportunity, or mechanical obstruction at the verge of the anus, or a weakened or paralyzed state of the muscular coats of the bowel, causes accumulations of faeces and of flatus, remarkable distention, not only of the rectum, but also of the colon, is thereby produced, so that the former fills up a very large space in the pelvic cavity. The rectum, moreover, in connexion with the colon, produces more or less of change in the blood circulating to its mucous surface. The numerous follicles with which this surface is studded actively aid in depurating the blood and in removing materials which, if allowed to remain, might act injuriously when carried into the portal and pulmonary circulations, while the secretions which they furnish constitute a portion, and facilitate the evacuation of the intestinal excretions. The rapidity and amount of absorption by the internal surface of the rectum, whether by venous imbibition or by lymphatic absorption, as demonstrated in health and disease, and by the injection of fluids, simple, medicated, or poisoned, are of great importance as respects not merely disease of this bowel, but also the administration of medicinal agents.

3. (*c*) The *sympathies* of the rectum and anus are of importance not only as respects the diseases of these parts themselves, but also those of the other divisions of the alimentary canal and of the several associated and related parts, more especially the urinary and generative organs. *Continuity* of surface, membrane, and structure; *contiguity* of position, and the mutual support derived therefrom, and from the interposed and surrounding adipose tissue; the *connexions* consisting of vascular communications and of nervous distribution—an abundant distribution of organic or ganglionic nerves in connexion with the ganglia and plexuses supplying the urinary, generative, and intestinal viscera—an evident accession of spinal nerves, both sensory and motory, to these nerves and ganglia, and to the structures of the rectum and anus, this accession becoming more marked and abundant as the anus is approached—and the muscular apparatus with which the outlets of the intestinal, the urinary, and the genital canals are provided, combine to associate various phenomena affecting these parts, and to develop numerous sympathies in disease. A knowledge, or a due recognition of these sympathies, especially in respect of their sources and relations, very materially assists our researches into the nature and treatment, not only of the affections to which the intestinal outlet is liable, but also of those which implicate the rest of the canal, and which are seated in the urinary and sexual organs. This knowledge, moreover, is often one of the chief aids which we possess in the appropriate administration of curative means.

4. (*d*) The *diseases* of the rectum and anus

will receive but a brief consideration in this place, especially as several of them require surgical treatment, although neither so generally nor so frequently as many surgical writers maintain. The strictly medical discussion of these diseases will chiefly engage my attention, and with a due regard to the importance of the topics which will successively come before me. Much misapprehension has existed, and still more misrepresentation has gone forth, respecting the sources, the nature, the frequency, and the treatment of several of these diseases, both medical and surgical; and while not only in practice, but also in publications, deception, mystification, and injurious means have been resorted to or recommended by a few, the nature and treatment of these maladies have been elucidated by several able, experienced, and honest writers, to whom and to my own observations I shall chiefly refer.

5. I. MALFORMATIONS OF THE RECTUM AND ANUS fall not within the province of the physician beyond a recognition of their nature and consequences, as all attempts to remedy them belongs to the province of the surgeon. These malformations are, 1st. Imperforation of the anus. 2d. Imperforation of the rectum. 3d. Unnatural termination of the rectum. 4th. Termination of other organs into the rectum; and, 5th. Absence of the rectum. It is chiefly the first and second of these which admit of surgical aid; and the writers referred to furnish ample directions for the best manner of affording it. I may add, that the anus may be so formed as hardly to amount to a malformation requiring surgical aid, although sometimes occasioning or heightening disorders which are more or less medical. This outlet may be either too *small* or narrow, congenitally, or too *large*. The former may be so considerable as to interfere with the function of defecation, and lead to serious consequences. Hence the occurrence of such a conformation should be kept in mind in cases of faecal retentions during infancy and childhood. A *large* or *wide* anus is not infrequent; and when the sphincter ani is impaired in power, prolapsus of a portion of the rectum is thereby favoured, and a portion of the mucous secretion of the lower part of the bowel, sometimes with a little fluid faeces, occasionally escapes.

6. II. FOREIGN BODIES IN THE RECTUM, AND LACERATION OF THE RECTUM AND ANUS, although strictly belonging to the surgeon, should receive due attention from the practical physician.—*A. Foreign bodies* may be lodged in the rectum in three ways: 1st. The body may have been swallowed, and have passed along the alimentary canal without occasioning much or even any disorder until it reached the lower part of the rectum, where it is retained. 2d. Concretions may form in the bowels, or indigestible substances may collect and congregate in them, or gall-stones may pass into them and occasion obstruction in the rectum. Although these are not always foreign to the economy, they are as respects the healthy functions of the bowels, and there act as foreign bodies. 3d. Various substances or bodies may be introduced accidentally or voluntarily into the rectum through the anus, and occasion mechanical irritation, or obstruction, or ulceration, or inflammation, according to the nature, form, or consistence of such bodies.

7. (a) *Foreign bodies* are often swallowed by infants, and accidentally by children or older persons, and, after passing through the bowels, causing either little or no disturbance, or more or less suffering, are arrested at the sphincter ani, producing painful tenesmus and straining, and much consequent disease, if the state of the anus and rectum be not carefully examined. Instances are not infrequent of infants and children having swallowed rings, with various kinds of stone, coins, pebbles, the large stones of fruit, pieces of glass, &c., and experienced little or no disorder until they reached the sphincter, by which they were arrested. An attentive examination of the anus, as soon as straining at stool is complained of, and a careful introduction and turn of the finger in such cases, will readily turn out the obstructing body.

8. (b) *Concretions* formed in the bowels are occasionally passed along the canal until they reach the anus; and, when much fecal matter and flatus are collected in the colon and rectum, behind the concretion plugging up the inferior portion of the rectum and anus, the nature of the disorder is often misunderstood, and a mischievous perseverance in the exhibition of purgatives by the mouth often increases, instead of removing the evil. Nor is the cause of disorder always ascertained by prescribing enemata; for these may pass the cause of obstruction—the pipe of the instrument may either pass by the side of the concretion, or may even perforate the substance of the concretion so formed, and be retained, or pass off by the channel formed by the pipe, without any effect. But the patient may not escape so fortunately; for the enema may be administered by an ignorant or a careless nurse, who, in attempting to introduce the pipe of the instrument, and to overcome the obstacle which the concretion furnishes, may actually push the pipe into, or even through, the parietes of the bowel, and convert an easily remedied disorder into a dangerous or even fatal disease. Concretions of various kinds have formed in the bowels and been thus arrested at the sphincter ani, occasioning remarkable disturbance, sometimes without the exact seat and nature of the obstruction having been for some time ascertained. Hardened feces may collect to such an amount as to fill up the greater part of the pelvis, the muscular coats of the rectum being paralyzed by the inordinate distention. But, when the parts are irritable, small concretions, or hardened feces of comparatively small bulk, will produce great disorder from the irritation, and the consequent straining they occasion, and from the accumulations of feces and flatus, and of retained secretions and excretions above them. In the course of practice, I have been called to cases where the concretions obstructing the rectum and anus consisted in one case of brown paper which had been habitually chewed and swallowed; in another of wax, which had likewise been chewed and swallowed; in a third case of sealing wax of various colours, which had been likewise swallowed; and in a fourth of chewed cedar of which drawing pencils are made. The first and last of these cases occurred in girls at school, the substances having been reduced to a pulp, and having passed into the bowels, were cemented by mucus into balls so hard as not to

be capable of changing their form so as to pass the sphincter without producing great disorder. The second and third of these cases occurred in married women, under thirty years of age, without children; the wax being agglutinated into large hard balls. These concretions were numerous in all the cases, had evidently existed long in the cells of the colon, until the irritation they produced and the treatment adopted had dislodged them and carried them to the rectum, when they were arrested by the sphincter. Besides these, magnesia, the carbonate of iron, and other substances, may form concretions productive of the disorder, to which attention is now directed.

9. (c) The *treatment* of indurated substances, whether altogether foreign or partly or wholly formed in the bowels, is generally simple, and, if judiciously managed, may be brought to a successful issue without much or even any surgical aid. Warm olive oil should be carefully injected; and the concretions, if still retained, should be turned out by the slow introduction of the finger, and the gradual resistance thereby furnished to the irritable contractions of the sphincter will facilitate their expulsion. When the concretions are less indurated, or consist of hardened feces, they may be broken down by the handle of a spoon, or by a marrow-spoon, and then oleaginous enemata will remove the parts which still remain. As respects the effects produced by *foreign bodies* introduced through the anus, and the removal of these bodies, I must refer the reader to the surgical works enumerated or referred to in the BIBLIOGRAPHY.

10. (d) *Lacerations of the rectum and anus* are not infrequent occurrences. They vary much in their extent, in their seat, and as respects the direction in which they occur. They may be complete or incomplete as regards the coats of the intestine; and they may be limited to either the rectum or anus, or extended to both. The rectum or anus, or both, may be torn partially by the passage of large concretions, or hardened fecal matters, passed hastily, or after violent straining. Such occurrences are rare; and the laceration is generally *partial* or *incomplete*, or involving merely the inner coats. *Complete laceration* takes place almost always from external injury or accident, and from parturition. *This form* of laceration may be limited to the anus, or not extend above the sphincter, and it commonly is caused by parturition. An instance, however, came under my notice of its occurrence from sitting upon a chamber pot which had been previously cracked. A *second form* is that consisting of rupture of all the coats within the sphincter, the anus, especially at its origin, not being injured. This form may be caused by foreign bodies in the rectum, by an unnatural position of the child during parturition, or by the unskilful use of instruments for this process. A *third form* of laceration consists of a division of the rectum and anus, and is caused by parturition. In this variety the recto-vaginal partition, the perineum, anus, and sphincter are all torn, the rectum and vagina forming one cavity.

11. (e) The *treatment* of partial and complete laceration of the rectum and anus is chiefly surgical. When the laceration is only partial, medical treatment will generally be sufficient.

A prudent recourse to olive or castor oil, to oleaginous and demulcent enemata, occasionally to suitable ointments, to the supine posture, and to a spare farinaceous diet, will commonly remove this lesion in the course of a few days. Inattention or maltreatment, a too full diet, or a too heating regimen, may cause partial laceration to be followed by inflammation, or by ulceration, or by abscess, or by fistula, lesions which will be considered in the sequel.

III. INACTION OF THE RECTUM AND ANUS.—SYNOPSIS.—*Local Paralysis of the Rectum and Anus; relaxation or atony of these parts.*

CLASSIF.—I. CLASS, I. ORDER (*Author in Preface*).

12. DEFIN.—*Retention and accumulation of fecal matters in the rectum, with constipation and a sense of fulness and weight in the pelvis, and with an inability to expel the contents of the bowels.*

13. This complaint, which is not infrequent in aged persons, especially in old females of sedentary habits, in aged debauchees, and in other persons who have exhausted the energies of the ganglial and spinal nervous systems, has hitherto been confounded with the more common states of constipation. It is, moreover, the usual form of constipation in connexion with palsy, especially with paraplegia and general palsy; costiveness or obstinate constipation thus proceeding not only from various kinds of obstruction in the vicinity of the anus or in the rectum, but also, in a different class of cases, from defective contractility of the muscular coats of the rectum, owing to impaired or lost power of the ganglial and spinal nerves actuating these coats.

14. i. CAUSES.—(a) The circumstances chiefly predisposing to this complaint are the usual causes of debility or exhaustion, more especially very advanced age; sexual excesses, masturbation, or excessive voluntary or involuntary pollutions; want of exercise in the open air, sedentary occupations and habits; the rheumatic and gouty diathesis, especially when accompanied by pains in the loins from congestion of the spinal sinuses or veins, and low or nervous fevers, or convalescence from them.

15. (b) The most common exciting causes are neglect of the early intimations to evacuate the bowels, the rectum thus becoming over-distended by feces and flatus, and the muscular coats thereby losing their powers of contraction; paraplegia or paralytic affection of any kind; hysterical disorders; inordinate sexual indulgences; diseases of the kidneys; congestion of the spinal veins or sinuses, however produced; exposure to cold or to currents of air, especially when directed on the loins or sacrum, and an excessive use of calomel or aloetic purges. But whatever impairs the vital energy of the ganglial and ganglial plexuses of the pelvic viscera, or whatever suppresses, removes, or diminishes the influence of the spinal nerves, with which the pelvic ganglia are reinforced, as congestion, inflammation, injury, or structural lesions of the spinal cord, will generally be followed by inaction or paralysis of the coats of the rectum, and generally also with relaxation of the sphincter ani.

16. ii. SYMPTOMS.—Besides the usual symptoms of constipation, the patient feels a weight and distention, sometimes with pain or aching in the pelvis toward the sacrum. The desire

to evacuate the bowels is often slight or absent; or if it be experienced, there is an inability to accomplish the intention. In many cases the retained feces, which are the lowest in the rectum, become remarkably indurated, and furnish an obstacle to the evacuation of the portions above. In some of these cases the sphincter ani is so relaxed or paralyzed as to admit of the hardened feces being seen through the open anus. Not infrequently these cases proceed from neglect of local examination, and from purgatives given by the mouth being confided in alone, until a fatal issue ensues; and, if the administration of enemata be intrusted to an ignorant nurse, the nature of the disorder is equally unknown; and these medicines are reported to have been either inefficacious or immediately returned.

17. If the complaint continues, without removal of the fecal accumulations, ulceration or sphacelation of some portion of the parietes of the rectum, with absorption of excrementitious materials into the circulation, is a common result, occasioning low irritative fever, pains about the sacrum, vomitings, suppression or incontinence of urine, restlessness, followed by coma and nervous symptoms, varying with the circumstances and complications of individual cases. In some instances, violent pains, occurring in paroxysms, are complained of toward the close, or at an advanced stage of the disease, and dart down into the pelvis and to the anus; but contingent phenomena vary remarkably with the age of the patient and the morbid associations or peculiarities of the case.

18. iii. COMPLICATIONS.—This affection occurs much more frequently in connexion with some other malady than as a simple or primary disorder. In the latter form, it is occasionally met with in aged persons or exhausted constitutions, more especially in sedentary females; and it may continue until the unfavourable issue mentioned above (§ 17) supervenes. It is a common attendant upon paraplegia, partial or complete, or from whatever cause, and upon general paralysis, and the palsy of the insane; and, in these maladies, it is often associated with relaxation of the sphincter ani, fecal accumulations being thereby prevented, the evacuations passing off involuntarily, or as position and gravitation may favour their exit. It is also not infrequently complicated with diseases of the uterus and ovaria, with displacements or enlargements of the uterus, or with diseases of the kidneys or urinary bladder, or with enlargement or other lesions of the prostate gland. It is often associated with impaired function of the rest of the digestive canal, or with torpor, obstruction, or organic lesions of the liver.

19. iv. TREATMENT.—In the more simple states of this disorder purgation requires to be aided by stimulating enemata. Often a combination of disulphate of quina with the purified extract of aloes, or this latter with the compound galbanum pill, or these three medicines conjoined, will sufficiently excite the action of the rectum. If these fail, the more violent cathartics, as croton oil, the extract of elaterium, &c., will occasion more disorder than benefit; for, if this latter be derived, it is only temporary, inaction of the bowel being increased by them. Suitable enemata are generally required,

and the addition of the spirit of turpentine to the injection is usually beneficial. It is not uncommon to find the rectum enormously distended with hardened faeces, when proceeding to administer an enema; but the state of the rectum and anus ought to be previously ascertained, and the accumulation should be removed, at least in part, by direct and mechanical means, before an injection is administered. The kind of enema adopted ought to depend upon the circumstances and complications of the case, and the effect produced; but a daily recourse to it is generally requisite.*

20. In complicated cases, the treatment should also be directed to the associated malady; but in these, generally, the means now recommended will prove more or less serviceable, although others may be required in addition. In all cases the state of the urinary functions requires attention, and undue accumulations of urine in the bladder must be prevented. The condition of the sphincter ani, and of the sacrum, or other parts unduly pressed upon, should be ascertained; for, when the sphincter is relaxed, much inconvenience and increase of disorder, with bed-sores, &c., will follow, and will with difficulty be prevented, although the greatest care be exercised, especially in aged, paralytic, and debilitated persons. In these persons especially, not only are the muscular coats of the bowel paralyzed, but the secretions from the villous surface and mucous follicles are remarkably diminished, thereby favouring induration of the contents, and delaying or preventing their passage from the bowel. In these cases the injections, whether saponaceous, saline, oleaginous, or terebinthinate, may be advantageously thrown up as high into the colon as possible by means of the flexible tube, as recommended by Dr. O'BEIRNE, for in such instances faecal accumulations may exist far above the rectum. The combination of disulphate of quina, aloes, and compound galbanum pill, recommended above (§ 19), or the two former with inspissated ox-gall, as advised by me in 1832, will generally restore the action of the bowels, unless in extreme or seriously complicated cases.

IV. INFLAMMATIONS OF THE RECTUM AND ANUS.

—SYNON. *Proctitis* (from $\pi\rho\omicron\kappa\tau\omicron\varsigma$, anus); *die Afterentzündung*, Germ.

CLASSIF.—III. CLASS, I. ORDER (*Author in Preface*).

21. DEFIN.—*Pain and heat in the anus, extending up the sacrum and pelvis, with continued tenesmus or straining.*

22. Inflammations of the rectum and anus have been most unaccountably neglected by medical and surgical writers, and too generally overlooked in practice, more especially by those empirical physicians who plume themselves upon being "bold" or "active" practitioners, and who are so on inappropriate occasions, "ad captandum vulgus," rather than from a conviction of the benefit derived by those who are subjected to the infliction. *Proctitis*, in some form or other, I have frequently found produced,

either as a sequence or as a complication of some other disorder, by "heroic" practitioners, who claim for themselves a special consideration and notoriety, actually produced by the excessive doses, or frequent repetition, or prolonged use of those substances which irritate the lower bowels. How remarkably indebted must the surgeons of the present day, and, indeed, of the last half century, have been to physicians and others, for their frequent recourse to large doses of calomel and other medicines which have either excited or perpetuated, or in both modes developed, not merely inflammation of the rectum and anus, but also the various organic lesions about to be noticed as consequences of inflammation of these parts.

23. *Inflammations of the rectum and anus* are not of one only type or kind as respects the nature of the morbid action, and the consequences which follow. As I have shown, when treating of INFLAMMATION and of DYSENTERY, proctitis may be *sthenic*, or *asthenic*, or *acute*, *sub-acute*, or *chronic*. The inflammation may commence in the rectum, and extend even to the verge of, and around the anus; or it may begin in this latter situation and mount upward, not merely to the rectum, but also to the colon, and even to the cæcum and small intestines. In all cases, and these by far the most numerous, the disease extends to the colon and cæcum, and often still farther, constituting, according to the character of the constitutional and local symptoms, the forms of DYSENTERY which I have so fully considered, as not even now to admit of any addition, alteration, or correction. When inflammation is confined chiefly to the rectum and anus, although closely allied to dysentery, it is nevertheless more or less distinct from that malady, more especially when it is sub-acute or chronic, and is produced, as I have seen it in numerous cases, by the treatment which has been either adopted on erroneous principles or carried too far. When thus produced by medicinal agents, proctitis may commence in the rectum, or in the lower part of the colon and rectum, or extend from one to either. When it is caused by agents acting externally or locally upon the anus, it may be then limited to this part, if the agents are not contaminating; but if they are infecting or contaminating, the rectum is soon invaded, and the inflammation, always then of an asthenic and spreading character, extends much higher, and to an indefinite extent.

24. i. SYMPTOMS OF PROCTITIS.—The phenomena of this disease vary with the cause, with the constitutional powers of the patient, and with the severity of the morbid action.—*A. Acute sthenic Proctitis* is attended by heat and pain at the anus, shooting or extending to the lowest part of the back or under the sacrum, and by a continual desire to go to stool, with straining, and with the passage merely of mucus, sometimes streaked with a little blood. In some instances an exudation of lymph, similar to that in croup, takes place, and is thrown off in a more or less consistent or membrane-like form. If faeculent matter be passed at any time, it is usually with much increase of pain, and after having been retained for a longer or shorter time by the irritable and constricted sphincter; and the passage of pellets of faeces, with the straining or tenesmus, often occasions

* The temperature of the enema is important, for if often had recourse to, and the fluid employed be warm, the effect will be relaxing and thus increase the difficulty under which the patient labours. We have in such cases always used cold enemata, and with decided advantage, the astringent influence of the cold tending to give tone and energy to the relaxed tissues.]

a slight prolapse of the inner coats of the bowel, which appears swollen, red, hot, and injected, partially covered with mucus, or with exudations of lymph, and with the mucous follicles enlarged. When the prolapsus is more considerable, and is accompanied with spasmodic constriction of the sphincter, the pain and restlessness are much increased, and shoots upward along the sacrum in severe paroxysms, a distressing aching being constant in this latter situation.

25. The *symptomatic disturbance* varies with the constriction and severity of attack. There may be neither rigours nor chills at the commencement, unless the disease follow the local action of cold, or the cause be of a severe character. But more or less febrile action, with a white or loaded tongue, heat of skin, impaired secretion and excretion; scanty urine of a high colour, voided frequently and with difficulty, owing to the extension of irritation to the prostate gland and neck of the bladder; an accelerated, full, or strong pulse; loss of appetite, but rarely vomiting, unless the disease has been neglected, or faecal matters have been long retained and largely accumulated, and constipation of the bowels.

26. The *terminations* of this form of proctitis are, 1st. Resolution; 2d. In hæmorrhagic exudations, which may resolve the inflammation; or, if the disease be associated with a varicose state of the hæmorrhoidal veins or hæmorrhoids, as often is the case, in a hæmorrhoidal discharge; 3d. In ulceration of the inner coats of the bowel, the ulceration commencing either in the mucous follicles, the ulcers being either few in number or several, or in the abrasion of the villous coat, the ulcer being single, or very few; 4th. Rarely in sphacelation, unless that portion of the inner coats of the bowel which has protruded and been strangulated by the sphincter; 5th. In abscess in the vicinity of the anus, or external to some portion of the parietes of the bowel, or in the connecting cellular tissue between the rectum and neck of the urinary bladder, or between the rectum and vagina, the abscess ultimately terminating in fistula, or in one or more small abscesses in the connecting cellular tissue of the rectum or anus; 6th. In inflammation of the hæmorrhoidal veins, especially when the disease is complicated with hæmorrhoids; and, 7th. In chronic inflammation of the rectum and anus, and the several structural changes consequent upon it (§ 43, *et seq.*).

27. *B. Sub-acute and chronic Proctitis* may be either primary or consequent upon the acute form now described, the symptoms of the latter gradually subsiding to the sub-acute and chronic states successively. If the chronic form become prolonged, various changes of structure and complications may follow, attended by distressing symptoms; and, if the complaint receive not due attention, the life of the patient may be endangered.—(a) *Sub-acute sthenic proctitis* is characterized by similar symptoms to those above enumerated, the chief difference consisting in their milder form, and, if not appropriately treated, in their longer duration. This form is not infrequent in females; and in them the occurrence of the catamenia is often followed by resolution of the inflammatory action. With the exception of sphacelation, the

same *terminations* as I have stated to follow acute sthenic proctitis may also follow the sub-acute form, but generally as consequences of neglect or improper treatment, which often occasion this form to pass into the following and its consecutive organic lesions.

28. (b) *Chronic Proctitis*, although often consequent upon the acute or sub-acute states, may also occur primarily, especially in persons who are subject to hæmorrhoidal affections, or who have habitual recourse to calomel or aloetic and resinous purgatives, or who are exposed to the influence of certain noxious agents. This form of the disease may be seated chiefly in the mucous follicles, or in the mucous surface itself, or it may extend, especially when it is of considerable duration, to the connecting cellular tissue, occasioning more or less tumefaction or thickening of the parietes of the bowel. Chronic proctitis is more frequently a complicated than a simple affection; and, when associated with other disorders, as with hæmorrhoids, [the nursing sore-mouth], with leucorrhœa in the female, with spasmodic stricture, or with fissures of the anus, it may be either the primary or secondary affection. It is generally attended by more or less tenesmus or pain and straining at stool; by a sense of aching or pain under the sacrum; by slight prolapsus of the inner coats after alvine evacuations; sometimes by dysuria and frequent micturition, and often by the exudation of mucus from the anus—*Proctorrhœa* of some authors; *Medorrhœa ani* of J. P. FRANK—especially when the irritation is kept up by the presence of ascarides in the rectum, or when the mucous follicles are affected, or when the disorder is associated with leucorrhœa.

29. The *Terminations* of chronic proctitis are, 1st. Resolution; 2d. Ulceration, generally commencing in the mucous follicles; 3d. Fistulous ulceration, with or without abscess or purulent collection in the vicinity of the anus; 4th. Fissures of the anus, generally in connexion with hæmorrhoidal tumours, or spasmodic stricture of the rectum, or with both; 5th. Tumefaction, thickening, and ultimately induration and constriction of the coats of the rectum; and, 6th. Ulceration, associated with thickening, or with induration and constriction, or with all these changes.

30. *D. Asthenic Acute Proctitis* may commence with or without rigours; and, although it occurs chiefly in delicate, exhausted, and cachectic persons, it may affect any temperament or constitution when the contaminating or infecting exhalations which usually produce it are directed against the exposed anus; as when persons frequent privies which contain accumulated fæces, and emit an abundant infecting vapour.—a. This form of proctitis is attended by many symptoms of the sthenic acute form; but the symptoms are more severe, the suffering more acute, the spasm of the sphincter is more severe, or occurs in more distinct paroxysms, and the mucous discharge following the straining is more copious, watery, ichorous, or bloody, and more offensive than in the sthenic form. The disease, moreover, is rarely limited to the rectum, unless the treatment be prompt, energetic, and judicious, but extends along the colon, and assumes all the characters of asthenic dysentery, with the constitutional symp-

toms and terminations described when treating of this form of that malady (*see art. DYSENTERY*, § 20, *et seq.*). Asthenic proctitis is generally attended by much fever; a quick, soft, or weak pulse, by much heat of skin; a foul or loaded tongue; by tenesmus, dysuria, or frequent micturition; by retention of faecal matters, and many of the phenomena of adynamic fever. Prolapsus of the inner coats of the bowel is frequent; and, if this be attended by violent or continued spasm of the sphincter ani, sphacelation, foul ulceration, exudations of an offensive sanies, implicating more especially the prolapsed parts, are common results.

31. *b.* The terminations of this form of proctitis depend upon the period at which treatment has been adopted, and the nature of the means employed. Besides the terminations already mentioned (§ 26), the passage of the disease into dysentery, especially the asthenic form, contamination of the circulating fluids, vital exhaustion, extensive ulcerations, sphacelation, and the other consequences of dysentery, may supervene.

32. *c.* The complications of asthenic proctitis are often serious, and demand careful examination and treatment. The neck, and even the parietes of the urinary bladder, with the prostate and urethra, are not infrequently implicated in the male, causing frequent and painful micturition, or even retention of urine; and the vagina, os and cervix uteri, are even still more frequently affected in the female, occasioning severe paroxysmal pains, referred to the vagina and uterus, and sometimes also much disordering the urinary functions.

33. *E. Syphilitic and gonorrhæal proctitis* are occasionally observed, especially in females of a certain class; but these specific forms of disease require no farther notice at this place, than that the practitioner should not mistake their nature. They are more frequent in females than males, chiefly owing to the readiness with which the infecting virus may be communicated, by proximity of parts and by position, from the vagina to the anus. Syphilitic proctitis often speedily passes into ulceration, &c., within and around the verge of the anus, while the gonorrhæal form of the disease is attended with much excoriation, swelling, and discharge at the orifice of the anus, and at the internal surface of the nates adjoining the anus.

34. *F. Inflammation, often with extensive excoriations of the anus*, is not infrequent in infants and young children. In some cases the inflammation seems to originate externally to the anus, or at its external margin; and is either symptomatic of disorder of the digestive canal, caused by the state of the mother's or nurse's milk, or by improper food, or by disordered secretions and excretions; or it is more directly produced by want of cleanliness, and the accumulation of irritating sordes in this situation. In plethoric, gross, or unhealthy children, the inflammation almost threatens the adhesion of the opposite surfaces of the nates. In those cases the disorder is attended by much fever—by a hot, dry skin, and a full, excited pulse. In other instances, the inflammation extends to the anus from the rectum, and then the child has remarkable straining, with very scanty mucous evacuations tinged with blood, and often

also dysuria. This state of the affection is not infrequent during weaning or dentition, and is often symptomatic of disorder of the digestive canal at these periods, or is caused by the nature or the excess of the ingesta. In some cases the disease assumes a sub-acute asthenic form resembling aphthæ, upon which it not infrequently supervenes, or with which it is complicated; more or less disorder or marked lesion, apparently extending along the whole digestive canal, but becoming more developed and apparent at both the entrance and outlet—in the mouth and lips, and in the anus, where the vital action of the parts is modified by the copious accession of sensory and motory spinal nerves (*see art. THRUSH*).

35. *ii. CAUSES.*—(*a*) The predisposing causes of proctitis are the irritable and sanguine temperaments; an irritable or susceptible state of the intestinal canal; the existence of worms in the intestines; a full habit of body in connexion with hæmorrhoidal affections; venereal excesses and voluntary or involuntary pollutions; diseases of the prostate gland or neck of the bladder; and morbid or long-retained alvine secretions and excretions.—(*b*) The exciting causes are chiefly those which act through the medium of the intestinal canal, and those which act externally or locally. Of the former, the ingesta, medicinal and dietetic, are the most frequent and important. Calomel and other preparations of mercury in large or too frequent doses, or in prolonged courses; arsenic similarly prescribed; aloetic and resinous purgatives habitually or frequently taken; hypercatharsis, however produced; the prolonged or excessive use of emmenagogues; substances swallowed with the food, accidentally or otherwise, which irritate or penetrate the coats of the rectum, as fish-bones, or the spiculæ of other bones; the husks, seeds, or stones of fruit; and the very hot and least soluble spices, when taken in excess. Other substances accidentally swallowed, which irritate mechanically the rectum or anus; morbid or retained secretions and excretions, accumulated fæces, concretions formed in the bowels, hæmorrhoidal affections, and the irritation of worms, are also occasionally exciting causes of this complaint.

36. The external agents are chiefly injuries, accidents, wounds, or operations, implicating the rectum or anus; the contingencies of parturition and the puerperal state; the administration of acrid or stimulating enemata, injections or suppositories; injury sustained by the bowel during the administration of enemata; abstracted animal heat by sitting on cold seats, on stones, or on the ground; currents of cold air; the application of gonorrhæal or syphilitic poisons, or other infecting agents; and frequenting foul privies where the faecal accumulations are great, and where the foul exhalations rise against and infect the anus during defæcation. Of the influence of this last cause of proctitis I have observed several proofs in the course of practice. The inflammation which has resulted has generally assumed the form of asthenic dysentery (*see DYSENTERY*, § 20, *et seq.*); and when females have been exposed to this cause, not only has asthenic proctitis passing into dysentery been the occasional result, but also asthenic vaginitis, sometimes with asthenic hysteritis, attended by acute pain

and by a copious or an offensive vaginal discharge, this complication appearing most frequently and remarkably in married females.

37. iii. TREATMENT should differ most remarkably with the activity and character of the inflammatory action, and the nature of the predisposing and exciting causes.—A. In *sthenic acute proctitis*, local depletions, especially cupping over the sacrum, leeches to the perinæum and around the anus; cooling and demulcent aperients; the warm bath, semicupium or hip bath, followed by cooling diaphoretics, and fomentations, with an antiphlogistic regimen, are the most efficacious, and generally remove the disorder in a few days. If much pain and tenesmus continue after depletion, the compound ipecacuanha powder, or simple ipecacuanha, with henbane, extract of hop or of poppy, ought to be given in the form of pill, the ipecacuanha in as large and frequent doses as the stomach will tolerate; and, having allayed the irritability, the bowels should be evacuated by fresh castor or olive oil, or by sulphur and magnesia, aided by confection of senna, or by a glass of lemonade taken soon after the magnesia, or by a demulcent, laxative, or oleaginous enema.

38. B. The *sub-acute* and *chronic* states of the complaint generally yield to the same means as just advised, local depletions to a less amount being usually sufficient; but these should vary with the habit of body and circumstances of the patient. Ipecacuanha, cooling diaphoretics, warm baths, and emollient laxatives, with demulcent and anodyne enemata, are generally beneficial. If external irritation, heat, or excoriations are experienced at the anus, a cooling and anodyne lotion, as a solution of the diacetate of lead, with vinum opii and acetic acid, will give much relief, and may be kept applied for a considerable time by means of pledgets of lint. The secretions and alvine excretions, especially the biliary, should be promoted by means of hydragryum cum creta, or PLUMMER'S pill, conjoined with ipecacuanha and soap, interposing a dose of castor or olive oil, or a demulcent and oleaginous enema.

39. C. *Asthenic proctitis* rarely admits even of local depletions, unless in plethoric persons. As the chief danger in this form of the complaint proceeds from the rapid extension of the disease along the rectum to the colon, the principal indication is to prevent or limit the extension by such means as experience has shown to be most efficient in this mode of operation. I have found the warm bath or hip bath followed by a warm terebinthinate embrocation applied over the sacrum or the hypogastrium, and the following pills, among the most efficacious means. As soon as the more painful symptoms, especially the spasm of the sphincter ani, were relieved, or even without waiting for such relief, the subjoined draught was also administered.

No. 328. R Pulv. Ipecacuanhæ; Quinæ Disulph. Camphoræ, ʒʒ. gr. j. Extr. Hamuli, vel Extr. Gentianæ, gr. iiij.; Confect. Aromat. gr. ij.; Mucilag. Acaciæ, q. s. ℞. Fiat Pilule, ij, quarta vel quinta quaque hora sumendæ.
No. 329. R Olei Terebinth., Olei Ricini, ʒʒ. ʒss.; Aque Mentha Virid., ʒʒss.; Tinct. Capsici, m. iij. ℞. Fiat Haustus.

40. Demulcent and anodyne enemata are always beneficial if early employed, or before ulceration or sphacelation of the internal coats of the bowel has commenced; but the utmost

care ought to be taken in administering an enema, lest the pipe of the instrument injure the swollen, softened, and tender parts along which it is passed. In every other respect the treatment should be identical with that advised for *asthenic dysentery*, especially if the morbid action has advanced to the colon and cæcum, or has continued any time. (See art. DYSENTERY, § 88, et seq.).

41. D. *Inflammations and excoriations of the anus and rectum in infants and young children* (§ 34) should be treated with a strict reference to this cause. The diet of the infant, and even of the nurse, should be changed or corrected; the secretions and excretions improved and promoted; and, after the warm bath, emollients, &c., the zinc ointment, or lead ointment, or cooling lotions, or other means which the peculiarities of the case require, should be applied. In most of these cases, more or less constitutional disorder is associated with disease of the alimentary canal; and this latter is seldom confined to the rectum and anus, the colon or the digestive organs generally participating more especially in the existing derangement. In these circumstances, the hydragryum cum creta, conjoined with ipecacuanha, with small doses of rhubarb, and with absorbent powders or other antacids, will frequently prove most beneficial; and sometimes equal parts of precipitated sulphur and carbonate of magnesia, to which powdered liquorice root and cinnamon are added, in quantity sufficient to render the whole more pleasant, may be taken in milk or in water.

42. E. *The specific—gonorrhæal and venereal—forms of inflammation of the anus and rectum* should be treated conformably with the principles which guide the treatment of these maladies in other situations and circumstances. The local affection will, however, require much of the soothing means already advised for other inflammations of these parts; the gonorrhæal especially, local depletions, saturnine or cooling and anodyne lotions, &c.; and, internally, the balsams, especially copaiba, powdered cubebs, or a decoction of the *Achillea millefolium*. Clysters are of doubtful advantage in the specific states of the disease, as they may favour the extension of the specific infection from the anus to the rectum and lower parts of the colon.

43. iv. *ITCHING OF THE ANUS*.—A. This is generally a symptom only of diseases of the digestive canal, or of the rectum and parts in the vicinity. It is often, however, so distressing as to form the most prominent disorder, and is then a most obstinate one to remove. It is most commonly caused, at all ages, by ascariæ in the rectum, by other intestinal worms, and by chronic eruptions around the anus. It sometimes follows recovery from dysentery. It frequently precedes and accompanies hæmorrhoidal affections; and it often attends and follows the cessation of the menstrual discharge. It is often attended by more or less of mucous discharge from the rectum, or "*medorrhæa ani*." Pathologically, it may be viewed as an indication of either irritation of the intestinal canal, especially of the rectum, or congestion of blood in the rectum or anus, or cutaneous eruptions near the verge of the anus. It is often produced by the accumulation of feces in the rectum and colon; by the abuse of calomel, or of

aloes, or of other purgatives which act chiefly on the rectum; by various exciting emmenagogues; by irritation or enlargement of the prostate gland, and by self-pollution.

44. *B.* The treatment should be directed to the pathological and exciting causes, and to the complications of the case. Local bleedings are sometimes required, and these are often advantageously followed by cooling lotions, as the acetate of lead, with acetic acid, and the tincture or wine of opium. The yellow wash, or weak solutions of the nitrate of silver, and the other means advised for the chronic cutaneous eruptions affecting this part, should be employed when any one of these is the cause of the itching. In the more obstinate cases, clysters containing turpentine will be found most efficacious; and lotions, or a wash, with a saturated solution of the biborate of soda, will also prove most beneficial and appropriate to all the circumstances in which the symptom appears.

45. *v. Mucous Discharge from the rectum*—*Medorrhœa ani*, J. P. FRANK—is often caused by the same pathological states as produce itching of the anus (§ 43). *A.* It may proceed also from a chronic state of inflammation of the lower portion of the rectum, and precede, accompany, or follow hæmorrhoidal attacks, the hæmorrhoidal flux being very frequently followed by this discharge. When caused by inflammatory irritation or congestion, it may prove a substitute for the sanguineous evacuations attending hæmorrhoids. It is distinguished from gonorrhœa affecting the anus, or “venereal blennorrhœa,” by its tenacious state and transparent appearance, which it commonly retains.

46. *B.* The treatment of this discharge depends upon the cause. It is often produced by the abuse of calomel and aloes, and by resinous purgatives and emmenagogues, and is readily cured by relinquishing the use of these. It is a frequent consequence of the congestion or local determination of blood produced by masturbation; and hence it should excite suspicion of this vice, the existence of which will render treatment inefficacious, but the relinquishment of which will alone remove the disorder. When it follows proctitis or dysenteric attacks, or attends hæmorrhoidal tumours, or follows sanguineous evacuations from these tumours, the treatment advised for HÆMORRHOIDS will then be required; and when it is caused by intestinal worms, the treatment prescribed for these parasites is then necessary. In many cases, the means recommended for itching of the anus, or for chronic proctitis, will remove this affection.

47. *vi. ABSCESS OF THE RECTUM AND ANUS.*—*A.* Abscesses may form in connexion with the rectum or anus, or with both, either consecutively of some form of inflammation of these parts, or from the extension of disease from adjoining parts, or, secondarily, from phlebitis or from purulent absorption.—(*a*) When either of the forms of inflammation terminate in abscess, the surrounding and connecting cellular tissue is the seat of the purulent formation. If the abscess form near the anus, it is formed in and confined by the surrounding adipose substance. The abscess may be *between* or *external* to the coats of the rectum: if the former, it is generally very small, or several may exist; if the latter, it is much larger, and is generally

single. In cachectic habits it may be very large, and spread to a dangerous extent.

48. Small abscesses, which form in the parietes of the rectum, or superficially near the anus, are generally consequent upon inflammatory irritation in the mucous membrane or its follicles; and in the more healthy subjects, and when the treatment is judicious, they generally terminate without producing any of the consequences to which the larger purulent formations often lead. When the mucous follicles of the rectum or anus are irritated, either by the nature of the excretions which pass over them, or by medicinal excitants, or by the morbid matters existing in the blood that they are partly concerned in eliminating, the irritation may, especially when occasioned by this last cause, rapidly pass into ulceration, which, if it extend to the connecting cellular tissue, may be followed either by purulent collections or by fistula, or, more commonly, by both these in succession.

49. (*b*) Abscesses seldom form externally to the coats of the rectum or to the sphincter ani, independently of inflammatory irritation of the rectum or anus, or of the urinary and sexual passages. A small abscess or boil may, however, appear, independently of irritation of these parts, external to the sphincter, or near the anus, owing to want of cleanliness or to some other cause, and may, if opened early, and otherwise properly treated, in no way implicate the adjoining canals or their outlets; but, if neglected, or if suppressed externally, it may extend upward or along the rectum, especially in cachectic habits, and ultimately perforate the parietes of the bowel above the sphincter, and be followed by fistula. Although an abscess may occasionally thus originate, and with an apparent independence of any irritation or disease of the adjoining canals or of their outlets, I believe that instances are rare in which these affections, either of the mucous surfaces or of the follicles, are entirely absent. These affections proving the exciting cause of the inflammatory action and suppuration external to the rectum or anus.

50. (*c*) Irritation or inflammation passing into abscess in or near the rectum or anus, although commonly originating in those parts, and produced by the causes mentioned above (§ 35, 36), frequently proceeds from disease—from inordinate excitement, irritation, inflammation, or other lesions of adjoining parts. In females the abscess may be a consequence of irritation in the sexual passages, and be seated in the anterior parietes of the bowel, or in the recto-vaginal partition, or in the perineum, and may point or open into either canal or externally, according to its position. In males, inflammatory irritation or diseases of the urethra, of the prostate gland, or of the neck of the bladder, may extend to the adjoining cellular tissue, and endanger the integrity of the rectum by exciting inflammation of, and abscess in or extending to, this tissue. Even the means used to cure disease of the urinary and sexual organs, in both sexes, may excite inflammation or irritation, which will extend in this direction and terminate in purulent formation, which may open into the rectum. Abscess in the vicinity of the rectum or anus may, moreover, depend upon disease of some one of the pelvic viscera,

or upon disease or caries of a portion of bone in the vicinity; but these are comparatively rare occurrences, or causes of abscess in this situation. It should not, however, be overlooked that an abscess may appear near the anus, or may partially surround or open into the rectum, owing to the extension of disease, and to purulent extension and infiltration from the vertebræ, the abscess being, in such case, merely a variety of psoas abscess, proceeding from inflammation of the intervertebral spaces, or from caries or tubercular disease of the bodies of one or more of the vertebræ.

51. (*d*) Abscess, or abscesses, may form in the rectum or anus from inflammation of the veins of these parts, or of a hæmorrhoidal tumour, or of a dilated or varicose vein, the purulent collection being more frequently external to the vessel, or in the surrounding cellular and adipose tissues, than within, or involving the coats of the vein. It is not improbable that inflammation of the hæmorrhoidal veins, when commencing in their internal or serous membrane, may sometimes extend more or less along them, and contaminate the blood, or cause coagulation of the fluid in them, or other lesions fully described in the article on the pathology of the veins, and be associated with purulent collections in their course, either internal or external, as respects their parietes; but these results are certainly not so frequent as may be expected from the exposure of these vessels to the several causes of irritation and inflammation, which so often act upon the rectum and anus, and influence the circulation through the hæmorrhoidal veins, both in health and in disease. It still more rarely happens that secondary collections of matter form near the rectum or anus in consequence of purulent absorption, the few instances of abscess in these situations which have occurred in the puerperal state being those in which inflammation of the veins of the uterus or of the appendages has extended to the veins and cellular substance adjoining, and has implicated those parts in or near the rectum or anus.

52. *B. The symptoms of abscess* near to or implicating the rectum or anus vary remarkably, in severity and character, with the causes of the inflammation of which this is the consequence, with the severity of the inflammation and the extent of the abscess, in no small degree with the particular situation of the abscess, and with the constitution and habit of body of the patient. The symptoms are often, at first, those of proctitis, especially when the disease commences in the rectum or anus itself. But when the abscess proceeds from inflammation of the adjoining parts, passages, or outlets, or when it is so external to the rectum or anus as at first not to implicate these parts, little inconvenience is experienced there until the outlet is pressed upon, or consecutively inflamed by the progress and distention of the purulent collection.

53. When the abscess is apparently, or even really unconnected with the bowel or sexual or urinary passages, and is at some distance from the anus (§ 49), it generally appears in the form of an ordinary boil, and proceeds with central hardness, swelling, redness of a dusky tint, and throbbing, with symptomatic fever, varying in character and severity with the constitution of

the patient. If the abscess be of a sthenic nature, the attendant fever is more or less inflammatory, and the tendency to point externally is manifest; but if it be asthenic, or the constitution cachectic, the local inflammation and the matter produced by it may be diffused, and isolate a portion of the parietes of the rectum or of the sphincter, and disconnect it from the adjoining parts. In these cases, the constitutional symptoms are always adynamic, and, however frequent the pulse, the vital powers are more or less depressed. In some of these the abscess will hardly point externally, or if it thus point, it will do so imperfectly, or assume the character of carbuncle. When the abscess forms near the side of the anus, and much redness or swelling and pain extend to the buttock, with considerable fever, then the more painful symptoms subside upon the formation of matter, especially in the sounder constitutions, and throbbing, chilliness, followed by a disposition to perspirations, with external pointing of the abscess, are chiefly experienced. If, however, the matter is more diffused, if the disease is more asthenic, if the constitutional powers are weak or exhausted, if the superficial appearance of the abscess is more carbuncular, and if more than one opening have appeared on the surface, both the local and general symptoms may be aggravated, or, at least, not abated, and, with the diffusion of the local lesion, the adynamic fever seriously, if not dangerously increased.

54. The severity of the symptoms and the consecutive evils are much increased when the abscess is consequent upon changes of the coats of the rectum, or upon ulceration of the mucous follicles of the rectum or anus, or upon inflammation of hæmorrhoidal tumours, or of the hæmorrhoidal veins; for, in these circumstances, not only are the local changes more complicated, but the constitutional affection is more severe, and the tendency to terminate in fistula, if not in still more serious changes, much greater. Much, however, in respect of severity of local and general symptoms, will depend upon the constitution and habit of body of the patient, and upon the exact seat of the local change. Integrity of vital power will prevent a dangerous extension of the mischief, while depressed or exhausted energy, and an impure state of the circulating fluids and their several concomitants, will increase the evil. The exact situation of the abscess will also remarkably affect the symptoms. If the matter form on one of the sides of the anus, the symptoms will be much less severe than in any other situation: they will be severer if it forms posteriorly, and still more severe if it collects anteriorly; as in this last situation it implicates parts of greater sensibility than in the other situations; and, in the male especially, it involves parts concerned in very important functions—whether extending merely to or originating in these parts—and interrupts more or less painfully, and even seriously, their offices. The abscess may in this situation involve the prostate gland, or neck of the bladder, or the urethra, or the vesiculæ seminales, either primarily or consecutively, and thus interrupt the excretion of urine, or cause retention of it, with various associated phenomena.

55. In females the symptoms are seldom so severe as in the male, especially when the ab-

cess is anterior to the anus or points in the perinæum; and yet I have seen in two cases, of which strong females of a sanguine temperament were the subjects, both the local and the constitutional symptoms most acute, the abscess having been seated high in the recto-vaginal partition. In such cases, the abscess will not point in the perinæum, but either in the vagina or rectum, according as the parietes of either is primarily or chiefly affected, or as the irritation or cause existed in the one canal or in the other; but when pointing in either direction, perforation of the parietes is generally the consequence, and the risk of fistula being the result is great, especially if the rectum be perforated and the constitution be at all in fault.

56. vii. **ULCERATION OF THE RECTUM.**—A. Ulceration of the coats of the rectum is not infrequent, especially in the course or as a consequence of acute or chronic dysentery, of diarrhœa, especially of colliquative diarrhœa, and of tenesmus. It may take place as a termination of one of the forms of proctitis described above, and it may be either the consequence or the cause of abscess of the rectum or anus. It is frequent in the course of tubercular formations in the lungs, and less so in the advanced progress of organic diseases of the liver. In the former, it is often productive of fistula, having previously occasioned more or less suppuration, or distinct abscess in some cases, or a less obvious collection of matter in others; and it generally commences in the mucous follicles, and is often caused by the state of the blood consequent upon softening of tubercles in the lungs, and the absorption of tubercular matter. Ulceration may also follow the opening of an abscess into the rectum, when the matter proceeds from inflammation of adjoining parts, especially of those already enumerated (§ 49–51). It may possess asthenic or reparative character, in which case a favourable issue soon takes place; or it may present an asthenic or spreading form; or it may even assume a sloughing or rapidly disorganizing state. It may, moreover, be specific or venereal.

57. B. Ulceration of the rectum or anus is more frequently a complication of other maladies, as of those of the lungs, liver, &c., than a primary and simple lesion. It is often associated with other changes in the rectum—with inflammation of the rectum, or of the colon, or of both; with prolapsus ani, with fissure of the anus, with stricture and thickening of the parietes of the bowel, with hæmorrhages from the rectum, of which it is often the cause, and with hæmorrhoidal tumours, internal or external. It is often complicated with, or consequent upon, thrush and excoriations of the anus in children (§ 34), chronic dysentery and diarrhœa, at all ages and in all climates, and disease of the mesenteric glands. It is not infrequently associated with lesions of the urinary and genital organs in both sexes, and with tubercular formations in different parts of the body, but more particularly in the lungs.

58. C. *The causes of ulceration of the rectum are the same as those which occasion proctitis or abscess of the rectum and anus; more particularly the several diseases just mentioned as often associating with them these lesions, as tubercular formations in the lungs or in other parts; disease of the liver and digestive canal;*

hectic and other fevers; the several kinds of dysentery and diarrhœa; local irritants, and septic or contaminating vapours directed on the anus and rectum in foul privies; substances lodged in the rectum; operations and injuries implicating the rectum or its vicinity; certain kinds of ingesta, both medicinal and poisonous, taken too frequently or in too large doses, as calomel, arsenic, &c.; scurvy and morbid states of the blood; and excessive sexual indulgences. (See § 35, 36.)

59. D. *The symptoms of ulcerations of the rectum are often those of chronic proctitis, especially tenesmus, the discharge of puriform, or a mixture of purulent, sanious, and mucous matters in the stools; more or less pain during the passage of the fæces, often with partial prolapsus of the inner coats of the rectum, and with more or less blood, sometimes a little only, following the fæculent evacuation. If the ulceration exist near to the anus, it may be associated with some degree of fissure, and a sanious or puriform discharge may either exude constantly or be discharged at intervals from the anus. When the ulcer is considerable, and low in the rectum, it may be felt upon the examination, some degree of thickening, with slight induration of the edges and irregularity of the surface, serving to distinguish it. When it is beyond the reach of the finger, or above the sphincter, its existence may be inferred from the history of the case, especially from the appearance of purulent or sanious matter, or of blood, in the stools, but unmixed with the fæces; from the circumstance of these discharges having followed symptoms of proctitis or of abscess, or attacks of dysentery or chronic or colliquative diarrhœa; from the pain under the sacrum or pubis just before or during evacuation of the bowels; and from the partial prolapsus often attending fæcal evacuations. But it is rather from the association of several of these, than from either singly, that this change is to be inferred. (See art. HÆMORRHIAGE—from the Intestines, &c., § 197.)*

60. E. *Syphilitic ulceration of the rectum or anus is a general attendant as well as consequence of syphilitic proctitis. It occurs most frequently in females, owing chiefly to the proximity of the infecting and infected surfaces. The specific characters of the syphilitic ulcer are often, but not always, present. When these are absent, as well as in other circumstances, the history of the case and the conduct of the patient, as far as that is known, will serve to guide the diagnosis. The existence of other syphilitic symptoms, primary and secondary, should also be ascertained.*

61. viii. **FISTULA IN ANO.**—*Rectal Fistula.*—Fistula is the consequence of abscess or ulceration of the rectum or anus, and hence it proceeds from the same remote causes—predisposing and exciting—as occasion either or both these lesions. It has usually been divided into three varieties, the last of which, however, is very doubtful. 1st. *Complete fistula*, which has two openings, one in the rectum and the other externally. 2d. *Incomplete internal or external blind fistula*, which has an opening in the bowel, but none externally. 3d. *The incomplete external or internal blind fistula*, which has an external opening, but no internal opening into the gut. The existence, however, of this third variety

has been disputed with much reason. More than one fistula may exist in the same person, and they may be of the same, or of the first and second varieties. They may present various differences; the fistulous canal may extend far up before opening into the gut, may have several external openings, may extend far beneath the external skin, may be attended by spasm of the sphincter, and by callosities, hardening, and disease of adjoining parts, as the vagina, bladder, urethra, prostate, or even of the pelvic bones.

62. The constitutional and pathological relations of fistula in ano—the frequent dependence of this lesion upon important visceral disease—have not sufficiently engaged the attention of surgeons in devising their intentions and means of cure. Hence the necessity of close investigation of the *causes* and *complications* of all cases of anal fistula which come under medical or surgical treatment. The *causes* of rectal fistulæ are those already mentioned in connexion with the diseases already discussed, but more especially injuries of the internal coats of the rectum by foreign bodies, or by retained matters in the bowel, and the suppuration or ulceration of bunches of hæmorrhoids perforating or destroying the inner coats of the gut. Fistulæ, from this latter cause, generally form slowly. The patient has itching at the anus, and a knobby swelling forms near the anus, which often merely empties itself by a small opening, or which has little disposition to break externally, but rather spreads upward, or it may be connected above, with a second opening into the rectum. In some cases the fistula is a consequence of injury, or of the burrowing of pus from some adjoining part, depriving the exterior parietes of the rectum more or less completely of their cellular connexions. These fistulæ are often critical, or, rather, the abscesses in which they originate. But more frequently the fistulæ accompanying constitutional disease, especially *phthisis*, originate in ulceration, frequently affecting the mucous follicles, in the manner already mentioned (§ 56).

63. According to the researches of SABATIER, LARREY, RIBES, and CHELUS, the internal opening of rectal fistula is most commonly immediately above the part where the internal membrane of the rectum joins the external skin, and rarely higher than five or six lines above this part. Such appeared to have been the result in seventy-five cases examined by M. RIBES. The condition of the fistula is partly shown by the nature of its origin and history of the case, by the circumstances of the discharge being either purulent or fecal, and by the passage of intestinal gas through it, especially after having been examined by the probe.

64. IX. TREATMENT OF ABSCESS, ULCERATION, AND FISTULE OF THE RECTUM AND ANUS.—The causes and the constitutional relations of these lesions should determine the indications and means of cure that ought to be adopted. If either lesion proceed from constitutional or general disease, the treatment should be chiefly constitutional and dietetic. If either have arisen from acute or sub-acute proctitis, the means already mentioned as appropriate for chronic proctitis (§ 38) may be employed; but these should be varied with the diathesis, the complications, the duration or the obstinacy of

the disease, and the habit of body of the patient.

65. A. When the *abscess* is of a sthenic character, is apparently only forming, then leeches and soothing applications may be employed; but in all cases, whether sthenic, asthenic, carbuncular, spreading, or burrowing, they ought to be opened as early as matter is formed, and a free external outlet to it be afforded. Afterward, as well as when *ulceration* of the internal coats of the rectum are ascertained upon examination, the treatment, both local and general, should depend entirely upon the features and pathological associations of the case. If the abscess or ulceration has not advanced to the formation of either an incomplete or complete fistula, such means as are most likely to promote the circulation through the portal vessels, and remove obstructions from the liver, ought to be adopted, aided by soothing, stimulating, or astringent and tonic means, locally or constitutionally, according to the peculiarities of the case. With these views, I have given PLUMMER's pill with soap and inspissated ox-gall, or the precipitated sulphur, with the bitartrate of potash, the confection of senna, and confection of black pepper, or with capsicum, according to the state of the case. If the rectum continue irritable, or if the ulceration be attended by spasm of the sphincter, emollient injections, the local application of the extract of belladonna, with either of the ointments advised for anal fissure, and a recourse to the decoction of the yarrow or millefolium, which was recommended to my attention by Mr. PERKINS, of Mortimer Street, will afford relief. If the ulceration be obstinate, small injections of a solution of nitrate of silver, or of mucilaginous mixtures containing spirits of turpentine, or the balsams, especially the Peruvian balsam; or pills, with ipecacuanha, capsicum, ox-gall, and one of the balsams, will generally remove the disease, if the evacuations and the diet be duly regulated, and if the constitutional powers be duly preserved or increased.

66. B. If the ulceration present a foul, spreading, *asthenic*, or gangrenous character, the treatment, both local and general, should be of an antiseptic and tonic nature. Applications containing one of the chlorides, or creasote, or spirits of turpentine, or the Peruvian balsam, small injections with these, and the internal use of the decoction of cinchona, with alkaline carbonates, camphor, serpentaria, capsicum, aromatics, &c., are indicated in these cases. When the ulceration is considered *syphilitic*, then mercurials, especially the bichloride, in gradually increased doses, or calomel, blue-pill, hydrargyrum cum creta, &c., may be prescribed according to the peculiarities of the case.

67. C. Rectal or anal fistulæ require the adoption of similar principles and means to those espoused above. These fistulæ often require an operation for their cure; but such operations ought not to be undertaken inconsiderately for the following reasons: 1st. The fistula may be symptomatic of disease of the lungs or liver—of the lungs especially—and the discharge from it may have a beneficial influence on the pulmonary malady. No attempts, therefore, should be made to close this safety-valve of the frame in these circumstances until another has been established in some other quar-

ter; besides, an operation in these cases is often followed by a recurrence of the fistula.—2d. *Fistulae* may occur in weak, irritable, nervous, and susceptible persons, even independently of tubercular formations, or of pulmonary disease; and yet an operation by *incision* or *ligature* may be followed by very painful or even dangerous consequences. The accidents which may thus occur are, severe or fatal hæmorrhage, inflammation, copious suppuration, colic, diarrhoea, peritonitis, retention of urine, constipation, erysipelas, &c. Although these ill effects of the operation are most common in persons constituted as above, yet they may appear also in the plethoric, the cachectic, and even in those apparently the least likely to be thus endangered.—3d. *Fistulae*, in favourable circumstances, especially during the adoption of means to improve the general health, of a suitable and regular diet, and of a treatment identical with or similar to that just advised (§ 65, 66), will heal up favourably, particularly when no visceral disease remains to perpetuate the symptomatic lesion. In all cases, the visceral disease should be investigated, and the treatment in great measure directed to it.

68. As to the performance of these operations I need only refer the reader to the able writings of A. COOPER, BRODIE, W. FERGUSON, CHÉLUS, SOUTH, and others referred to in the BIBLIOGRAPHY. But I may here add, that they should not be attempted when the patient is the subject of any form of pulmonary or tubercular disease; or whenever the fistula becomes a vicariously secreting organ, by which other ailments are alleviated or removed; or if it be connected with disease of the pelvic bones, or of the prostate gland, or with incurable disease of the liver. In many of such cases the patient may be relieved by enlarging the external opening of the fistula and by strict cleanliness. The operation, moreover, will often fail in very old fistulae, in those which have several openings, or which are connected with callosities or ruptures, or when the internal opening is out of reach. Even when no visceral disease exists, if the fistula have been of long standing, the operation should not be undertaken until an issue or seton has been prescribed.

69. V. FISSURE OF THE ANUS, SPASM OF THE SPHINCTER ANI, AND NEURALGIC PAIN OF THE RECTUM are more or less connected with each other. I very much doubt the existence of *spasm of the sphincter* independently of either *fissure* or *ulceration* within the verge of the anus; and the *pain*, which is often extremely acute in the rectum, especially after a stool, is generally dependent upon one or other, or upon both, these lesions, and is but rarely of a purely *neuralgic*, or even *rheumatic* or *gouty* nature. Indeed, the pain cannot be viewed as possessing those characters unless it be independent of spasm, fissure, and ulceration, and alternate, as the case may be, with neuralgia, rheumatism, or gout, in other parts.

70. I. FISSURES OF THE ANUS—*anal fissures*—have been well described by BOYER, DUPUYTREN, and BRODIE.—A. *Causes*.—Adults are exclusively subject to this disease. Children and young persons are exempt from it; and it is met with in persons between the ages of 25 and 60; most frequently from 30 to 45. It occurs in both sexes, but more frequently in fe-

males than males, and in those of nervous, hysterical, and irritable temperaments. The most common *exciting causes* are constipation and the irritation and spasm thereby sometimes produced. The passage of hard substances which abrade the mucous surface in the situation of the sphincter; injuries occasioned by the administration of clysters; the existence of hæmorrhoids or hæmorrhoidal tumours, and previous operations for these, and the venereal poison flowing from the female genitals and infecting the anus.

71. B. *Symptoms*.—The disease sometimes commences insensibly, in certain cases more rapidly or suddenly. The passage of stools is attended by heat and smarting, and, as the fissure increases, by violent pain, and a sense of spasmodic constriction at the anus. The pain often continues for hours after passing a stool; and in the worst cases it scarcely ceases. It is often increased by coughing, by micturition, or by exertion. It is generally lancinating or burning, and is attended by restlessness, an anxious expression of countenance, increased nervous susceptibility, and loss of flesh and strength. M. DUPUYTREN states that the disease consists in a lengthy and superficial ulceration in the folds of the mucous membrane of the anus. On separating the orifice and directing the patient to strain, a narrow cleft is observed, with its bottom red, and its edges slightly swollen and callous. It often extends into the rectum, and is more frequently seen at the sides and back of the anus than at its fore part. It rarely extends through the whole thickness of the mucous coat. The most distressing part of the affection is the painful spasm of the sphincter. Sir B. BRODIE remarks, that the constriction of the sphincter at first appears merely spasmodic; but in proportion as this muscle is called into action it increases in bulk, and after the affection has continued for some time it becomes considerably larger. DUPUYTREN and other surgeons consider the fissure or ulceration to be produced by the spasm; but, without denying that the spasm may occasion ulceration, I believe—and I state this from the history of several cases, two of which occurred as early in my practice as 1825—that the fissure or ulceration is commonly the cause of the spasm. The constriction of the anus is often so great as to render the introduction of any body, even the pipe of a syringe, both difficult and most painful.

72. Fissures present various differences according to their situation. When they are entirely *anal*, or are *below* the sphincter, and are external to the verge of the anus, they are much less painful, and the pains are not materially aggravated by the passage of faeces; but there is more or less pruritus; and in this situation the affection is often venereal, especially in females. Fissures may exist *above* or *within* the grasp of the sphincter, or in both situations, extending from the one to the other. When the fissure is above the sphincter it possesses more of the characters of an ulcer. It may be detected there either by means of the speculum or by introducing the finger, to which it feels hard, knotty, or rough; and it is very painful when pressed on by the finger, or when a hard-ended motion is passed; but the pain ceases soon after, and never continues so long and so

violently as when the fissure is grasped by the sphincter. When a consistent stool is passed, the portion of the faeces which passes over the ulcer or fissure is often covered by a puriform mucus, sometimes coloured with a little blood. When the ulcer exists above the sphincter, it does not present the appearance of a fissure, and is not usually attended by spasm, nor by remarkable pain until a motion is passed, but possesses the characters, and, by extending, produces the results already mentioned, especially copious hæmorrhages, abscess, fistula, &c.

73. *C. Treatment.*—Previously to 1825 this affection was generally treated by the operation first recommended by BOYER. At the commencement of that year I was called to a gentleman residing at Wisbeach, who was advised by his surgeon to have this operation performed, conformably with the opinion then entertained by the most eminent authorities. He had been long subject to hæmorrhoids, was remarkably nervous and timid, and had the greatest aversion, notwithstanding the violence of his pains, to undergo an operation. He came to London, and placed himself under my care, having heard that I had expressed the opinion that this affection may often be completely removed without any operation. Notwithstanding the severity and long duration of the case, I believed that it might be removed by medical treatment merely, and prescribed a light and antiphlogistic diet; demulcents with liquor ammoniæ acetatis; gentle and cooling laxatives; emollient enemata; and an ointment containing one part in seven of the extract of belladonna, which was applied after each stool, and with which the pipe of the enema syringe was directed to be covered when an enema was administered. Within three weeks he returned home quite well, and never had a return of the disease. In the summer of the same year (1825) I attended a lady residing near Russell Square for the same affection, and for which the same treatment was adopted with the like result. Since then I have not treated more than three cases, but these recovered without an operation, the means having been varied according to the peculiarities of each.

74. M. DUPUYTREN remarks, that fissures *below* and *above* the sphincter most commonly heal without an operation; the former with lincin or lint spread with simple cerate, opiate cerate, poplar ointment, mercurial preparations; and the latter by soothing and narcotic lotions of decoction of marsh-mallow, poppy-heads, nightshade, henbane, stramonium, &c., thrown up into the rectum. He says that spasmodic constriction is the true ailment, and that the fissure or crack is merely a secondary symptom. This, however, by no means agrees with my observation. The application of belladonna, when judiciously prescribed and aided by a proper general treatment, is commonly most successful in these cases. One part of the extract may be added to seven or eight of a suitable ointment, or the lead ointment or cerate; or one part by weight of the extract, and one part of the acetate of lead, to six parts of any ointment; and this pomade may be applied once or twice daily, or on the surface of a bougie. In cases where a lotion may be preferred to greasy applications, I have found a saturated solution of the biborate of soda, with the ex-

tract of belladonna, or vinum opii, used as a lotion, almost as efficacious as the foregoing; or a lotion with the diacetate of lead and an anodyne for the more external fissures. Sir B. BRODIE states that, though he formerly used a *suppository* with extract of belladonna with manifest advantage, yet he is not in the habit of frequently employing it. "Even used in the form of a suppository, the belladonna sometimes produces very serious symptoms by its influence on the brain." He therefore only gives purgative medicine to prevent hard stools, directs the introduction of a bougie before going to the water-closet, and prescribes an opium suppository at night. But the employment of belladonna in the form of a suppository is not required, and is always objectionable; and much of the success depends upon the selection of laxatives rather than purgatives, or upon the means by which the bowels may be kept gently open, and the irritation in the rectum and anus at the same time soothed—intentions which the experienced physician will readily fulfil.

75. ii. NEURALGIC, RHEUMATIC, OR GOUTY PAINS OF THE RECTUM OR ANUS, are rare, and cannot be admitted to exist, unless they appear connected with neuralgia, rheumatism, or gout in some other part, either before or after the pain had been felt in the rectum. Pains in the gut or in the anus are generally caused by ulceration, or fissure, or spasm of the sphincter, the existence of either of which should be ascertained whenever pains in these situations are experienced, and if they can be referred to either of these causes, the treatment ought to be directed accordingly. If, however, no such source can be detected, or if they are referable to neuralgia, rheumatism, or gout, the means which have been recommended for these maladies should then be prescribed, and aided by narcotic or anodyne suppositories or ointments, as advised for spasm of the sphincter.

76. VI. PROLAPSE OF THE RECTUM.—*Prolapsus ani*.—*Vorfall des Mastdarnes*, Germ.; *Chute du Rectum*, Fr.

CLASSIF.—IV. CLASS, I. ORDER (*Author*).

77. Prolapse of the rectum or anus appears under different forms: it may be *complete*, the prolapsus consisting of all the coats of the bowel, to a greater or less extent; or it may be *incomplete* or *partial*, and consist only of the inner coats. It may arise from *debility* only, as in children, and in these cases it is generally complete; or from *hæmorrhoidal tumours*; or from *irritation* or *chronic inflammation* of the internal coats; and in these two classes of cases it is generally incomplete or partial, consisting only or chiefly of the mucous and cellular coats. CÆLIUS states that this disease appears under *three forms*: it may be either the rectum with all its membranes, or simply the internal membrane, or an inverted upper portion of the bowel—*volvulus*, or intussusception of the upper part.

78. i. *Prolapse from debility*—*prolapse of all the coats of the rectum*—has been doubted by a few surgeons, who could have had no experience of the diseases of children, among whom this affection is by no means infrequent. Mr. COPELAND says, that "in almost every case of prolapsus ani it is the internal membrane of the intestine only which descends through the

sphincter." No doubt such is the case in the great majority of cases in adults, especially when the prolapse is consequent upon hæmorrhoids and changes just mentioned; but in children, and even sometimes in old persons, especially females, the prolapse is often that of all the coats, and not infrequently to a very great extent; although in them also partial prolapse, or protrusion of the inner coat only, sometimes occurs. It depends upon imperfect tonic contraction of the sphincter, and relaxation of the connexions of the bowel with the surrounding parts. It proceeds from the general debility observed in children reared in unhealthy localities, in the ill fed, and in the offspring of aged and debilitated parents. In some cases both the sphincter and the muscular coats of the bowel seem more or less paralyzed. The tumour is usually of a large size; and if it be allowed to remain for some time unreduced, the coats become congested, livid, and thickened, and much difficulty is experienced in reducing it. Mr. SYME considers that the prolapse, involving the whole parietes of the gut, is owing chiefly to irritation. This may be sometimes the case, especially as irritation is not infrequently associated with debility or want of tone of the parts, especially of the sphincter. The tumour is commonly round or oval, but sometimes cylindrical, varies in size from that of a small egg to that of a large orange, exhibits the slimy surface of a mucous membrane, and affords a secretion similar to red currant jelly. This protrusion is the same as an invagination occurring higher up in the bowels, and differs only in its being so low down as to become external.

79. The *symptoms* of the prolapse vary with the extent of protrusion, and with the habit of body and strength of the patient. They are commonly very severe, and most urgent in young or robust subjects. There are straining and pain at the anus, with obstruction of the faecal evacuations. If the protrusion continue, the pressure of the sphincter retards the return of blood from the protruded part, which then becomes engorged, livid, and swollen. Inflammation may follow if the prolapse be not removed, and increased pain, fever, ulceration, sphacelation, or peritonitis, may supervene. Recovery may follow the sphacelation of the protruded part, or death in consequence of peritoneal inflammation.

80. ii. *Prolapse from hæmorrhoids, or chronic inflammation of the internal coat*, is the most frequent form, and occurs to a much less extent.—(a) When it is consequent upon chronic inflammation or inflammatory irritation, there is generally more or less thickening, seated chiefly in the connecting cellular tissue. The frequent straining, often preceding and attending this protrusion, causes a relaxation and elongation of the internal coat, especially when hæmorrhoidal tumours complicate the affection. At first a little reddish swelling only appears, which gradually enlarges, becomes wider, is rounded below, but narrowed above by the sphincter, and, at its free extremity, has an opening by which the stools pass. The surface of the protrusion varies in appearance with the degree of constriction exercised by the sphincter, and with the duration of the displacement. It is red or livid, soft or slightly tense, often divid-

ed into several lobes, and covered with bloody mucus. Dr. BUSHE justly states that, when this protrusion occurs in children, it presents the appearance of a small pyramidal, red, and coiled tumour; while in the adult it is less red, and generally takes the form, either of two lateral flaps or of a circular fold. "In some of these cases, the portion of membrane protruded comes from the pouch of the rectum, while that within the sphincters remains in situ. When this is the case, the extremity of the little finger may be passed between that portion of the membrane which adheres to the internal sphincter and that which is protruded" (p. 204).

81. (b) Mr. COPELAND observes, that prolapsus ani has so many points of analogy with hæmorrhoids that it may be considered as the same disease in a more chronic and advanced state; and Mr. SYME thinks that the protrusion of the mucous membrane alone should be referred to the head of hæmorrhoids. Dr. BUSHE remarks, as to its *diagnosis* from hæmorrhoidal tumours, that the semilunar form of the flaps, the extent of their base, our ability to glide the folded membrane between the finger and thumb, as well as the absence of erection and hæmorrhage, are sufficient to distinguish this form of protrusion from hæmorrhoidal tumours. He adds, in respect of *intussusception* of the rectum, that, in cases of *protrusion*, a probe or the finger cannot pass higher than the border of the internal sphincter, owing to the doubling of the mucous membrane, while in *intussusception* no resistance is offered to the passage of either the one or the other.

82. iii. The *prognosis* of prolapsus ani varies with the age and other circumstances of the patient. In *children* it is generally soon cured, or becomes less and less frequent as the child advances in age. In adults and old persons it is a much more severe and obstinate complaint, and more readily and frequently recurs. In old prolapses considerable changes take place in the rectum and anus. A discharge of mucus is almost constant; the prolapsed mucous membrane becomes indurated, loses its villous surface, and sometimes ulcerates, especially when the sphincter is relaxed, and when the patient is subject to much straining at stool.

83. iv. The *causes* of prolapse of the rectum in *childhood*, among whom this complaint is most frequent, are the irritation of teething, or of ascarides in the rectum; diarrhœa occurring during or after weaning; insufficient or unwholesome nourishment; attempts to dispense with a healthy nurse; general or local debility and relaxation of the pelvic viscera; violent screaming and straining at stool, especially when produced by purgatives which irritate the rectum, as calomel, &c.; stone in the bladder; sitting on cold seats, and exposure of the loins to currents of cold air, occasioning a partial paralysis of the muscular coats of the rectum and sphincter.

84. The causes which most commonly produce this malady in *adults* and aged persons are those which frequently occasion hæmorrhoids or proctitis (§ 35, 36), and whatever weakens the tone of the sphincter ani and the attachments of the rectum to adjoining parts; the improper or frequent use of relaxing enemata or lavements; the neglect of the sub-acute or chronic forms of proctitis, especially when they

are attended by much straining at stool; residence in hot and unhealthy climates; the several forms of diarrhoea and dysentery, especially the chronic; thickening, induration, and poly-pous excrescences of the inner coats of the bowels; hæmorrhoidal tumours, and other organic changes of the parts; stone in the bladder or disease of the prostate gland; prolonged costiveness; intestinal worms; protracted self-pollutions; sudden or violent muscular efforts; previous injuries and operations implicating the rectum or anus; and injuries or diseases affecting the dorsal or lumbar spine.

85. v. *The treatment* of prolapse of the rectum should be regulated according to the *cause*, and the *age*, and other circumstances of the patient. The *first* object is to return the protrusion; the *second* is to prevent the recurrence of the prolapse.—(a) The *first* is generally accomplished with ease when the prolapsus is only partial; but when it is complete, or consists of the whole parietes of the bowel, the reduction of the protruded part is often difficult. But by pressing up the parts nearest the opening of the bowel first, and directing the pressure upon and in the direction of the opening, much less difficulty will be experienced. If the swollen, reddened, and inflamed state of the prolapsed part, or spasm of the sphincter, or both, prevent the reduction, the application for a short time of a piece of muslin on the tumour wetted with equal parts of tinctura opii and sulphuric ether, and allowing a rapid evaporation, so as to produce a quick transfer of heat, I have never known to fail in many cases in which I have advised it in cases of the complaint in children.

86. (b) In order to prevent a return of the complaint, the cause should be investigated, and the remote as well as the more immediate causes removed or counteracted. The numerous surgical writers who have entertained this subject have advised various operations, which are more or less painful, and not always devoid of risk; and these operations have not always been preceded by a sufficient trial of those medical and rational means, upon the failure of which only they should be resorted to. Partial prolapse, or that form of the complaint which is consequent upon neglected or prolonged hæmorrhoidal affections, is often complicated with chronic inflammation and thickening of the inner coats of the bowel, or with torpor or obstruction of the liver, and obstinate congestion of the hæmorrhoidal vessels, and unless these be removed by appropriate means, the prolapse will return frequently, and at last become almost constant. In these, as well as in several other circumstances of the complaint, PLUMMER'S pill, with soap and taraxacum, should be given at bedtime, and the bitartrate, tartrate, or acetate of potash in the morning and mid-day, either in a decoction of Achil-læa millefolium, or of the taraxacum, or in the compound decoction of scoparium, in doses sufficient to keep the bowels sufficiently open. After these have been taken some time, and if the excretions have then acquired a natural appearance, cold injections into the rectum, each containing about a drachm of the muriated tincture of iron, or two or three drachms of the spirits of turpentine to half a pint or twelve ounces of the vehicle, will generally be of great service. These injections may be repeated ac-

cording to circumstances; but care should be taken to preserve the secretions and excretions in a healthy and free state.

87. (c) In *children* especially, and when the prolapse is complete, the treatment should be more constitutional than local, or the latter ought to be in aid of the former. The means should be directed to the form of general disorder; and tonics, especially those containing the preparations of iron; cold salt-water, or sea-bathing, the douche of salt-water or weak brine on the loins, followed by active exercise; the cold medicated injections just mentioned; the muriated tincture of iron taken internally, preserving at the same time the bowels gently open, or at least preventing costiveness; and attention to suitable, light, and nourishing diet, avoiding bulky innutritious vegetables, will rarely fail in preventing a return of the protrusion. If the complaint be associated with intestinal worms, the treatment should be directed accordingly, the injection containing the turpentine, or an occasional draught with a moderate dose of this substance, and an equal quantity of castor oil, will produce a very decided benefit. In the more obstinate or prolonged cases, after returning the protruded bowel and adopting the above treatment, the patient should retain the horizontal posture for some time, and after using cold bathing or the cold douche, he may cover the loins with the emplastrum thuris comp., and have recourse to such means, medicinal and dietetic, as will promote the general health. When the above measures are unavailing, then the operations advised by surgeons may be adopted; for an account of which I must refer the reader to the works referred to in the BIBLIOGRAPHY, especially to those by FERGUSSON, BRODIE, DUPUYTREN, BUSHE, CHELUS, and SOUTH.

88. VII. EXCRESCENCES ABOUT THE ANUS AND POLYPI OF THE RECTUM are analogous affections.—A. The former sprout from the skin and mucous membrane adjoining the anus, and assume various forms, to which different names, as sycoma, fœus, mariscæ, cristæ, verrucæ, porrus, condyloma, &c., have been given. These excrescences are *caused* by friction, erosion, the irritation produced by morbid secretions and by neglect of personal cleanliness, and by specific poisons. They are prevented by avoiding these causes; and, when fully developed, they are best treated by the local application of strong solutions of iodine, or nitrate of silver, or of hydrochlorate of ammonia, or of bichloride of mercury, or other appropriate means. If these are inapplicable or are inefficient, excision or ligature becomes necessary.

89. B. *Polypi* are not infrequent in the rectum, and, like the same formations in other situations, they present either a *mucous* or a *sarcomatous* structure.—a. Dr. BUSHE considers the mucous species to be most common; M. SANSON the sarcomatous. M. STOLTZ (*Gazette Médicale de Paris*, 1841, p. 253) states that they are much more frequent in children than in adults; and that, while they occasion protrusion of the rectum, they are often confounded with that complaint. Their intimate structure has not been exactly ascertained. In children they present more of a mucous homogeneous structure, while in adults they have more of a fleshy or spongy structure. In a case which

was removed by my directions, the polypus had a serous-like cavity containing a little clear fluid, the walls being apparently amorphous. I have never observed any possessing a fibrous structure. Polypi of the rectum vary in their size, situation, and insertion. They may vary from the size of a pea to that of an egg: they may have a very broad or a very narrow base or pedicle. They may be seated near the verge of the anus or high in the rectum. These surfaces also vary; but they have generally the mucous aspect, a pale reddish hue, are rounded or oval, and are either smooth or equal, or more rarely lobulated. The mucous membrane appears thickened at or around the point of insertion. More than one may exist in the same case.

90. *b.* The *symptoms* produced by rectal polypi are different according to their seat and size. If low down, the polypus will protrude with faecal evacuations, or even remain protruded. It may be the cause of partial prolapse of the gut, and it may be mistaken for prolapse, whether occurring independently of or complicated with that complaint. When high in the rectum, it may not be recognised until an examination be made. When it is near the verge of the anus, it soon becomes external, and continues in this state. In rare instances the bowel and sphincter contract so forcibly as to strangle and detach it. When it is seated high in the bowel, it may not be readily distinguished from an invagination, although in this latter the aperture of the invaginated part may be felt, if the displacement be within reach. The polypus rarely advances to a considerable size without causing costiveness, and colicky pains in the course of the colon, with tenesmus. The straining is often distressing, but is attended by much less pain than when it is caused by inflammation. The evacuations, when soft, are contracted, flattened, and generally smeared with mucus and blood, or pus, so as to lead to the supposition of stricture of the rectum, an examination, however, readily determining this point. When the polypus increases in size and malignancy, the patient becomes sallow, and loses his appetite; his tongue is coated and his thirst constant. Emaciation, oedema of the lower extremities, and hectic fever supervene. Faecal evacuations are procured with difficulty, are scanty, and commonly not without the aid of clysters. Tenesmus and weight in the rectum increase, and are attended by lancing pains. There is much muco-purulent discharge, and often considerable hæmorrhage. If blood exudes from the surface of the polypus, and if it cannot be readily distinguished, on examination, from an invaginated portion of intestine, the diagnosis between them becomes difficult; but the symptoms of the latter are much more acute, and faecal obstruction much more complete, than those of the former, while polypus in the rectum is a much more protracted malady.

91. *c.* The *treatment* of rectal and anal polypi is the same as that usually adopted for polypi in other situations. Surgeons are divided in opinion as to the propriety of removing them by excision or by ligature: much may depend upon their seats and attachments; and probably, in the majority of instances, they should be removed by both—by ligature, and excision just

below the ligature, but let the surgeons decide this point.

92. VIII. CONTRACTION OF THE ANUS.—(a) This lesion is seldom observed; but it has occurred, owing to the following changes: 1st. By the contractions of a cicatrix either just within or just without, or implicating the verge of the anus; 2d. By the deposition of lymph, which has become more or less organized in the submucous cellular tissue, thereby forming a ring around the anus; 3d. By the production of lymph on the mucous surface of the lower portion of the rectum, which becomes somewhat organized, either forming filamentous bands, or narrowing the outlet both by its thickness, and subsequently by the contraction to which, like other false membranes, it is liable; 4th. By the various changes consequent upon chronic inflammation of the internal membranes, or of hæmorrhoidal tumours, or of veins, especially irregular thickening, induration, and cartilaginous transformation. These changes nearly approach one of those next to be noticed, and differ from it only in implicating the anus, more or less, instead of being seated in the rectum entirely. The *symptoms* of this alteration are those of permanent stricture of the rectum, the nature and seat of lesion being readily ascertained by an examination.

93. (*b*) The *treatment* should be adapted to the change occasioning the contraction; but in every circumstance the bowels ought to be kept gently open, inflammatory action should be subdued, and tumours, hæmorrhoids, or other associated lesions removed. Mechanical dilatation should be cautiously adopted after these preliminaries have been effected.

94. IX. STRICTURES OF THE RECTUM.—The rectum is subject to two kinds of obstruction affecting its parietes and narrowing its canal—the one is *spasmodic*, and occasional; the other is *organic*, and permanent until removed by treatment.—A. Mr. Mayo remarks, as to the part of the rectum which is the seat of *spasmodic stricture*, that no single point is more liable to this affection than another. The cases which he has met with have impressed him that the upper part of the rectum and the sigmoid flexure of the colon are most liable to irregular contractions of their muscular tunics.—(a) This complaint, especially when seated thus high in the bowel, is independent of fissures or ulcers in or near the anus; these lesions, however, frequently produce spasms of the sphincter and lower portion of the rectum, which are most severe or painful during and after the passage of a stool. Spasmodic stricture occurring thus independently of fissure or ulceration near the anus, is most common in debilitated constitutions and in nervous and irritable temperaments, and as a sequela of dysentery. It is apparently *excited* by the vitiated state of the biliary and intestinal secretions and excretions. The frequent or habitual recourse to purgatives, especially to those which excite or irritate the lower bowels, cannot fail of predisposing to this form of stricture, when it does not produce chronic inflammation or hæmorrhoids.

95. (*b*) The *treatment* of spasmodic stricture of the rectum ought to be chiefly dietetic and regimenal. The biliary and intestinal secretions and excretions, with the several digestive functions, should be improved and promoted by

means suited to the existing disorder, and the lodgment of vitiated secretions and faecal matters prevented by means of emollient, anodyne, and antispasmodic clysters. I have found these, and pills consisting of ipecacuanha, Castile soap, inspissated ox-gall, and sometimes also the extract of henbane, or of hop, taken twice or thrice daily, with due attention to diet, and regular exercise in the open air, remove the disorder in a few days or weeks.

96. *B. Organic or permanent stricture of the rectum* results from chronic inflammation, which, however, may have been associated, at one time or other, with additional lesions. — *a.* It consists of a partial thickening of the sub-mucous coat of the bowel and of the connecting or adjacent cellular tissue, through which means a smooth ring is formed, generally from a third to half an inch, more rarely to an inch in depth, which projects into and narrows the canal. Sometimes the thickening does not include the whole circle of the intestine, but a segment only. The ordinary seat of organic stricture is from two and a half to four inches from the orifice of the gut. But sometimes it occurs higher in the bowel, at six or seven inches from the anus; and a contraction of the same nature is occasionally also met with in different parts of the colon. (MAYO.)

97. *b. The symptoms* of stricture of the rectum generally come on slowly, unless the complaint follow acute or sub-acute proctitis. In other circumstances, or when it is, as most frequently, the consequence of chronic irritation or inflammation, the more urgent symptoms are slowly and gradually increased, and the obstruction is often very considerable before the patient has recourse to medical advice. There is always a sense of obstruction and weight in the lower bowel, which are not relieved effectually by attempts at evacuation; uneasiness, distention, and occasional spasmodic or colicky pain in the abdomen; pain in the sacral region, often advancing to the loins and extending down the limbs; itching and heat about the anus; frequent eructations and flatulent distention, with oppression at the præcordia; bearing down in females, and nervous irritability; headache, and dejection of spirits; and a vitiated state of the alvine secretions and excretions. When the disease has continued for some time, the hæmorrhoidal vessels often become congested, and tumours form near the anus, produced by extravasated blood, which in old cases occasion thickening and elongation of the skin about the anus. Owing to the local irritation and determination of blood, inflammation, passing on to suppuration, sometimes attacks the cellular tissue near the anus, forming abscesses, terminating in fistulæ. (BUSHE.)

98. The calls to stool are sudden, inefficient, and often amount to six, eight, or twelve in the twenty-four hours—generally two, three, or more taking place within a very short time. They are attended by much straining, which sometimes, if the stricture is high in the gut, gives rise to protrusion of the mucous membrane. Much flatus, and a small quantity of mucus, occasionally mixed with blood, are often all that is evacuated; but every two or three days faecal matter, in small pellets of hard, and in long, round, angular, or flattened portions, of small diameter, if soft, is discharged. After

each attempt, although the pain is very moderate, a sensation continues as if the bowels had not been emptied; and this being actually the case, several successive attempts, with only slight effect, are usually made in quick succession. When a sufficient quantity of faeculent matter and mucus is evacuated to afford some relief, the patient desists with fatigue, until a sense of fulness, weight, and tenesmus requires another effort. Occasionally the accumulation of faeces above the stricture, by irritating the mucous surface, causes an increased secretion from this surface, and the faeces, being thereby rendered more fluid, pass more readily through the stricture, and the accumulation is thereby either partially or altogether removed. If the stricture be not very high in the rectum, it may be reached by the finger, especially if the patient strains during the examination; but if it cannot be reached, the bowel should be sounded by the instrument recommended by Sir C. BELL, which consists of an ivory ball mounted on a stalk of whalebone.

99. In some instances, many years may elapse without the patient's general health being materially impaired, notwithstanding the faecal retention and daily sufferings. Ultimately, however, he loses his appetite, and becomes pale, emaciated, and hectic. At last purulent matter, so acrid as to excoriate the anus, is discharged in great abundance, and frequently it comes away when he coughs or stands erect. These symptoms increase until life is exhausted. (BUSHE.)—Some patients die before the disease arrives at this stage, owing to the obstruction and faecal accumulation; they become distended with flatus; breathe with difficulty; are distressed by singultus, and all the symptoms of ileus. The pulse is very frequent, small, irregular, or intermittent; the extremities are cold, are seized with cramps; and ultimately the features, which were previously anxious, are collapsed, and cold perspiration, restlessness, &c., usher in dissolution.

100. Dr. BUSHE remarks that, in a few cases, the stricture is partially destroyed by ulceration; but the portion of rectum immediately above it is more frequently thus affected. In these the intestine may communicate, by means of adhesion and ulceration, with the bladder in the male, and with the vagina in the female, thus forming a recto-vesical or recto-vaginal fistula, through which the faeces may pass. A much more common consequence, however, of the ulceration, especially when the ulceration is low in the gut, is the passage of faecal matters into the cellular tissue, forming stercoraceous abscess, passing into fistulæ, which may vary in number from one to a dozen, especially in females. The ulceration may also, after causing adhesions to another portion of bowel, open into it; or, failing of producing adhesions, open into the peritoneal cavity, and rapidly terminate by occasioning general peritonitis.

101. *c. The diagnosis* of organic stricture of the rectum is not without importance; for lesions of adjoining parts, as well as other lesions of the gut, may be confounded with stricture.—*(a) Retroversion, or enlargement of the uterus,* disease of the *prostate gland*; and *tumours* in the vicinity of the rectum, may simulate stricture by pressing upon and obstructing the canal of the viscus, by rendering defæcation difficult,

causing figured stools, tenesmus, mucous discharge, and fulness or weight in the sacral and perineal regions. In these an examination will disclose the nature of the complaint; and not the less readily, when painful chronic affections of the vagina occasion symptoms resembling stricture of the rectum, owing to the contiguity of situation and nervous communication.—(b) *Ulceration* of the rectum, or *fissure* of the anus, with *spasm* of the sphincter, can hardly be mistaken for stricture, if the state of the stools, and the remarkable pain attending the discharge of them, receive due attention; but these lesions may coexist with stricture, and then a careful examination can alone determine the presence of the complication.—(c) Stricture of the rectum may be mistaken for a *sarcomatous tumour* growing into the bowel, owing to the pressure of the stricture downward by the faeces accumulated above it. A careful examination per anum will generally lead to the detection of an opening admitting the point of the finger, and demonstrating the nature of the lesion.—(d) *The malignant affections* of the rectum will be distinguished from the organic stricture now being considered, by the sallow or leaden and cachectic hue of the countenance and surface; by the lancinating paroxysmal pains, and the rapidity of the ulcerative process.

102. *d. The causes* of stricture of the rectum are very frequently only those which have been enumerated in connexion with *proctitis* (§ 35, 36), especially when these causes have been in frequent or prolonged operation. The complaint is very rarely observed before the adult age or after the 60th year, and it is nearly equally frequent in both sexes. Mr. COPELAND thinks that women are oftener affected than men. Dr. BUSHE treated eight cases in females and seven in males. Stricture is obviously the consequence of previous disease—of chronic dysentery, diarrhoea, &c.—of slow inflammatory action, or of the frequently repeated irritation of purgatives on the lower bowels. In some cases the cause can hardly be determined.

103. *c. The treatment* of organic stricture of the rectum is chiefly surgical, consisting in great measure of mechanical dilatation. I cannot, however, see wherefore a lesion commencing so frequently in chronic inflammation, consisting principally in thickening of the connecting cellular tissue from the deposition of coagulable lymph, and passing into ulceration, should be so entirely or even chiefly treated by mechanical means. Much certainly depends upon the amount of change existing in the bowel; but the effects obtained from these means are not always satisfactory; and if due discretion as to their adoption, and caution in their employment be not exercised, increased pain and irritation, general distress with shiverings, sickness at stomach, colicky pains, and even peritonitis, may follow a recourse to them. In many instances, where bougies have been injuriously employed, the application of leeches to the anus, and mild laxatives and anodynes, would have afforded more or less relief; for I have no doubt that the constant state of emptiness in which the lower bowels are kept by purgatives, mercurials, and injections, in the usual treatment of those affections so generally ascribed to stricture, and the irritation produced by bougies, are no mean agents in actu-

ally producing or aggravating the complaint which they are intended to remedy. The nimia diligentia is commonly too conspicuous, with whatever intention it may be dictated. There can be no question as to the impropriety of preventing the lower bowels from experiencing that state of healthy distention necessary to antagonize the contractions of their circular fibres. All hollow canals contract inordinately, even to the extent of obliteration, when they are deprived of the natural antagonism produced by their contents. I have generally found that persons who were subject to stricture of the rectum had been, for a long period previously, in the habit of taking purgatives, which kept the lower bowels almost constantly in an empty and irritated state. At an early stage of the complaint, more benefit will arise from the use of such means as will remove inflammatory irritation, and allow the faeces to become the natural and daily dilator of the incipient constriction, than from those measures which are commonly recommended, and often too officiously employed. Nevertheless, those measures are frequently requisite, and are often successful in experienced and cautious hands.

104 In early stages of the complaint, after prescribing the treatment advised for the chronic states of proctitis (§ 38), an evacuation from the bowels should be obtained every day, or every other day, by mild aperients taken by the mouth, or by enemata. The laxatives which I have preferred in these cases have been castor oil, olive oil, manna, magnesia with sulphur, the confection of senna, the bitartrate of potash with biborate of soda, or the compound infusions of senna and gentian. The injections should not be too frequently administered unless the obstruction be such as to occasion dangerous faecal accumulation above the stricture, and they ought to consist chiefly of emollients and laxatives, as soap with olive oil, the biborate of soda in the decoction of marsh-mallows, and similar relaxing and soothing substances.

105. When it is determined upon to have recourse to instruments for the removal of contraction of the rectum, the fact should not be overlooked that these contractions generally result from chronic inflammation, and that the change thus produced, unless it has gone on to fibro-cartilaginous induration, disposes the part to laceration when even a slight dilating force is used, the sound adjoining parts readily yielding, while the contracted parts are as readily torn. Nor should it be forgotten that there is an intimate consent between the mucous canals of the pelvis and the peritoneum, injury of the former, especially mechanical injury, not infrequently exciting peritonitis, although the violence is sustained at a part of those canals which is not covered by peritoneum. A recourse, therefore, to bougies and other mechanical means of dilatation should be had with caution. As to this topic, and as to recourse to division of the stricture, I must refer the reader to the surgical authorities contained in the BIBLIOGRAPHY.

106. X. *INVAGINATION* OF A PORTION OF THE UPPER PART OF THE RECTUM, WITH OR WITHOUT CONTRACTION, occurs in rare instances.—*a.* When stricture takes place at or near to the junction of the rectum and sigmoid flexure of the colon, the pressure above may carry the

obstructed part down into the relaxed and dilated portion below, and thus produce either an incomplete or a complete invagination, although the stricture of the invaginated part be very slight. When the rectum is much dilated, or is in that relaxed or paralyzed state described above (§ 12, *et seq.*), the upper part, or a portion of the sigmoid flexure of the colon, or both, may thus be forced downward, or invaginated, even although no actual stricture of these parts exists. This state of disease has been noticed by Mr. CHEVALIER, Mr. EARLE, and Mr. MAYO. The last of these writers remarks, "that it originates in great laxity and dilatation, which is liable to be produced by frequent large accumulations of fecal matters in the rectum." When the bowel is in this condition, the upper part of it is liable to be invaginated, or to form a prolapsus within the lower. The prolapsed part, whether consisting merely of a fold of the internal membranes, or of the whole parietes of the bowel, soon becomes inflamed, thickened, or indurated, and the opening through it contracted, so that the symptoms and distress are thereby greatly aggravated.

107. *b.* The *symptoms* of this lesion are often ambiguous. But imperfect action of the bowels, frequent and ineffectual efforts to void the feces, discharges of puriform mucus, and aching pain, weight, and tenesmus in the sacral region, are most commonly complained of. As there is generally a capacious sac below the invaginated or contracted part, feces may accumulate there, the watery portion being absorbed, and the fecal part thereby rendered more consistent. The stools may thus be discharged nearly of their natural quantity and appearance, and the nature of the complaint may hence not be ascertained, unless an examination by the finger or speculum be properly made.

108. *c.* The *treatment* consists of the exhibition of gently aperient medicines, or, rather, of the combination of tonics with aperients, as of the compound infusions of gentian and senna, or of rhubarb and inspissated ox-gall, and of oleaginous enemata. In this, as well as in other affections of the rectum, the decoction of *Achillea millefolium* may be taken as follows, and may even be administered as an enema, omitting the tinctures and salts:

No. 330. R. *Achilleæ millefolii*, ʒij.; *Aquæ*, ʒxxiv. *Coque partem horæ quartam, et cola.* Liqueuri colati adde Elixar. Potassæ, ʒij.; Sodæ Bi-boratis, ʒj.; Tinct. Aurantii et Tinct. Cardamom. co., aa, ʒss. *M.* Fiat Mist.: cusjus tincti coch. ij. vel. iv. ampla, bis terve in die.

Subsequently astringent injections, especially those with the terebinthines or balsams, may be prescribed, and such mechanical means as the case may require be resorted to, more especially properly adapted bougies or tubes.

109. XI. CANCER OF THE RECTUM.—*Scirrhus contracted Rectum.*—*Carcinoma of the Rectum.*—*A. Malignant disease* may attack the rectum only, or both it and the anus, or it may commence in or affect chiefly the anus. Dr. BESSE states that it presents chiefly the cartilaginous, lardaceous, and encephaloid forms. The cartilaginous degeneration may commence either as hard tubercle on the mucous coat, or in the muscular tunics of the bowel, this latter being the most common. The muscular fibres become pale and firm, and the connecting cellular tis-

sue undergoes a similar process of condensation, without alteration of colour. As the morbid process goes on, this tissue often becomes lardaceous; and the walls of the bowel increase in thickness, and the cellular and muscular coats are sooner or later softened and confounded each with the other. Sometimes the mucous tunic is studded with lardaceous and encephaloid vegetations, while the serous coat presents cartilaginous tubercles. The lardaceous degeneration is thus superadded to the cartilaginous, but the one may occur without the other; and the muscular and cellular coats may be lardaceous, while the mucous tunic throws out encephaloid growths. The encephaloid degeneration is sometimes primary, commencing in the cellular tissue or mucous coat, but more commonly it is consequent upon the cartilaginous or lardaceous.

110. Any portion of the rectum may be first attacked, but the junction of the rectum with the sigmoid flexure of the colon, that immediately above the pouch, and the anus, are the parts most commonly affected. Adjoining organs are also frequently involved in the disease, especially the recto-vaginal septum, the os and cervix uteri, and the urinary bladder. The malady, instead of being seated in the rectum, may attack the colon, either in or near the sigmoid flexure, or considerably above that part, or in some other portion of the bowel. It may even coexist in the rectum with malignant disease in some other situation, as in the stomach or pylorus. The physical changes in the parts are, according to Mr. MAYO, contraction, a peculiar induration of the parietes of the bowel, thickening, and ulceration of the mucous surface. The induration results from the scirrhus degeneration of the muscular and cellular coats, the diseased parts assuming different appearances, according to the quantity and character of the morbid formation. In one variety, "the thickening is inconsiderable, but the mucous membrane is abraded, the muscular coat is hard, firm, gristly, and the canal of the bowel is narrowed. The muscular fibre is partly converted into, partly contained in, firm, gristly, fibrous substance." This form of the disease does not generally extend to the anus, but commonly begins from one inch to one inch and a half within this part, and occupies from four to five inches of the bowel, terminating abruptly upward, and more gradually toward the anus. Another or fungoid variety is characterized by considerable thickening, caused by a greater amount of scirrhus deposit than in the preceding. The scirrhus stricture is gray, fibrous, not quite opaque, much looser, and more succulent and lardaceous or fungous in parts than in the former kind. Fungoid cancer, at its commencement, generally occupies a portion only of the circumference of the bowel, and is felt as a hard tumour situated about three inches within the gut, and commonly upon its anterior surface, with the mucous membrane as yet unbroken. The morbid growth extends in each direction, upward to the flexure of the colon, and downward so as to implicate the anus, and to throw the anal integument into hard knots. This form of the disease is that which is most frequently found in parts of the large intestines above the rectum. In either form, the adipose tissue external to the rectum

becomes firmer and more crisp, as seen in the same tissue around a cancerous mamma.

111. According to the view of this malady taken by M. CRUVEILLIER, cancer may commence in any part of the rectum, and may assume any form of the cancerous degeneration, from the scirrhous induration to the soft medullary fungus, or encephaloid, or any, or even every form, may be blended in the same case. In women, among whom it is most frequently seen, it is often a mere extension of cancer of the uterus, or, rather, of the vagina, the disease affecting the recto-vaginal septum in such a manner as to render it difficult to determine in which canal it had commenced. It very rarely thus appears to commence simultaneously in the rectum and urinary bladder in men. M. CRUVEILLIER thinks that cancer of the rectum is mostly a local disease; but this is the case only at its commencement, or at an early stage, before the cancerous contamination of the blood and frame generally has taken place.

112. *B. Symptoms.*—Malignant stricture of the rectum is more frequently met with than the simple thickening and induration already noticed (§ 96, *et seq.*). Whatever may be its particular characters—whether scirrhous, sarcomatous, lardaceous, fungoid, or encephaloid—it encroaches upon and narrows the canal of the rectum, so as more or less to obstruct faecal evacuation, and occasion great and constant distress. The patient complains of a dull, fixed, or aching pain at the upper part of the sacrum, with severe shootings, or sharp exacerbations, extending down the limbs, with violent tenesmus, and a sense of weight or bearing down in the part, especially after evacuations, or whatever may cause irritation of the part. Bloody purulent matter, or a puriform sanies, is passed with the stools, which are thin and frequent. In the fungoid variety, discharges of blood may be large and often. Mr. SYME remarks, that though in the early stage difficulty may be experienced in passing the faeces, owing to the thickening of the coats of the gut, yet there is for the most part ultimately rather an inability of retention, from the action of the sphincter being impeded by the progress of the disease.

113. At an advanced stage, the countenance and general surface display more or less of the appearance of malignant cachexia, or a sallow, leaden, or greenish-yellow hue; and flesh and strength are lost, the blood also becoming deficient. On examination per anum, the bowel is found contracted, thickened, and irregular on the surface. The affected parietes are hard and unyielding, and morbid growths are felt projecting into the cavity, in some places in the form of rounded tubercles, in others with rough or ulcerated depressions. These changes may not feel very different to the touch from those which attend simple stricture, excepting in their greater degree; and hence more reliance is to be placed upon the symptoms indicative of malignancy, than upon the sensations furnished by the examination. The acute, lancinating, and paroxysmal pains, extending to the loins, pubis, and thighs; the sense of weight, aching, and numbness in the sacrum, loins, hips, &c.; the aggravation of these upon standing or walking; the irritability of the bladder, or incontinence or retention of urine; the more frequent and larger discharges of blood than in

simple stricture; the bearing down sensation, especially in females; and the general cachexia and anæmia, as the disease advances, sufficiently indicate the malignant nature of the malady. Ultimately hectic, exhaustion, abdominal tenderness, hiccough, vomiting, &c., usher in dissolution.

114. *C. Causes.*—This disease may occur at almost every age. Mr. MAYO has seen it as early as twelve years of age. It is most frequently met with between the ages of thirty and sixty. The encephaloid is the variety which is met with early in life; the scirrhous and lardaceous at more advanced periods. Women are certainly more subject to the malady than males, and more especially after the cessation of menstruation. Some local injury, as a blow on or near the part, has sometimes appeared to excite the disease, but generally the particular cause has not been recognised; and it is not improbable that the tendency to the complaint has arisen out of a constitutional vice or tendency.

115. *D. The treatment* of this malady is very unsatisfactory. But, although it admits not of cure, unless in those rare cases in which the anus only is affected, and even in these most rarely, and at an early stage, much may be done in palliating the symptoms, and even in prolonging life. The encephaloid or fungoid variety generally runs a rapid course, especially when it is attended by frequent discharges of blood; while the more cartilaginous, scirrhous, or lardaceous form may last for years. Diluent, emollient, and anodyne injections are generally requisite in this state of disease, in conjunction with those means, internal and constitutional, which I have advised for cancer in other parts. (*See art. CANCER, § 29, et seq.*) Sir B. BRODIE recommends opiate injections, and injections of linseed oil, either in a pure state or conjoined with lime-water, with the view of allaying irritation; he gives alkalies internally, with balsam of copaiba; and he very justly considers the preparations of opium to be indispensable, notwithstanding the inconveniences attending the use of them. Suppositories of conium or of henbane, or of both conjoined, or of opium with camphor, Peruvian balsam, or zinc ointment; mucilaginous injections, containing the chloride of zinc or creasote, with the solution of opium or sirup of poppies; and such laxative, emollient, and anodyne enemata as the state of the case may suggest, especially those with warm olive oil, with small quantities of camphor or balsam, will generally afford considerable relief. According to Mr. CALVERT, much benefit is derived from “carefully introducing a hollow tube of elastic gum, through which the faeces are drawn off by injecting tepid water.”

116. Of internal remedies, I can add nothing to those recommended for cancer in another place. (*See art. CANCER, § 29, et seq.*) The preparations of iron with narcotics, especially the *mistura ferri comp.*, with liquor potassæ, *tinctura conii*, or *tinctura opii*, or *tinctura camphoræ comp.*; or the iodide of iron in sirup of sarza; or the *pilula ferri composita* with the *pilula saponis cum opio*, may be prescribed and varied according to circumstances. As to resorting to excision of the part when the disease is limited to the anus or lower portion of the

rectum, the determination should depend upon the peculiarities and complications of the case. This subject is well discussed in the surgical works referred to, and in Mr. COOPER'S Surgical Dictionary.—(For other diseases connected with the rectum and anus, see articles DIGESTIVE CANAL, INTESTINES, HÆMORRHOIDS, HÆMORRHA GE from the Bowels, and DYSENTERY.)

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RHEUMATISM.—SYNON.—*ῥευματισμος*, a defluxion—from *ῥευματιζω*, to be affected by a defluxion, from *ῥεύω*, a fluxion, and that from *ῥέω*, I flow; *Rheumatismus*, Pliny, Sydenham, Vogel, Juncker, Sauvages, Cullen, Pinel; *Dolores Rheumatici*, Hoffmann; *Myositis*, Sagar; *Myitis*, Chrichton; *Arthrodynia*, Cullen; *Febris Rheumatica*, Auctor. Var.; *Arthritis Rheumatica*, Swediaur; *A. Rheumatismus*, Parr.; *Causa rheumatismus*, Young; *Arthrosia Acuta et Chronica*, M. Good; *Gliederfluss*, flusskrankheit, Germ.; *Rhumatisme*, Fr.; *Rumatismo*, Ital.; *Rheumatism*, *Rheumatic fever*, *Rheumatic pains*.

CLASSIF.—Class 1st. Febrile diseases; Order 2d. Inflammations with fever (Cullen).—Class 3d. Diseases of the sanguineous function; Order 2d. Inflammations (M. Good).—III. CLASS, II. ORDER (Author in Preface).

1. DEFIN.—Severe pains preventing, or remarkably aggravated by, motion of the affected parts; apparently seated in the fibrous structures, chiefly of the large joints, the aponeurotic expansions, and the fibro-serous surfaces; arising from external or manifest causes, and assuming various forms and complications—being sometimes remarkably acute, febrile, or inflammatory, and shifting their situations, often sub-acute, and oftener still less acute, non-febrile, unattended by heat or swelling, of chronic duration, and accompanied with debility or stiffness of the affected limb.

2. Although rheumatism is, owing to geographical and social circumstances, one of the most prevalent diseases in the British Isles, yet is it one respecting the nature and treatment of which there exist the greatest diversity of opinion and the least amount of undisputed knowledge. The remarkable prevalence of the malady, this diversity of doctrine, and the several very important pathological relations suggested to the thinking physician by every man-

ifestation of rheumatic affection, are sufficient to direct investigation to the subject with greater energy than has hitherto been bestowed on it, and with more success than has hitherto signalled it.

3. Rheumatism was not described, or even noticed as a recognised malady, by the ancients, either by this term or by any other, to which the assemblage of symptoms thus denominated can be traced. Yet the word is sometimes found in their writings, although it does not altogether represent the disorder to which the moderns have applied it, this name having been given by the former to affections, to which they attached the idea of a humoral defluxion, conformably with its derivation, especially to those characterized by mucous or pituitous discharges.* One of the earliest writers among the moderns, who employed this term according to its modern acceptation, treated of the subject in connexion with *catarrh*, an affection to which rheumatism is closely allied, and with which it is often complicated. (*Sec* J. VIGIER, *Tract. de Catarrho Rheumatismo*, &c. Geneva, 1620. In HALLER's *Biblioth. Méd. Pract.*, t. ii., p. 376.) SYDENHAM, however, was the first to treat fully of rheumatism, and to distinguish it from gout, with which it had been frequently, if not generally, confounded by former writers under the name of *Arthritis*. Subsequently BOERHAAVE, HOFFMANN, and JÜNCKER described the disease with tolerable accuracy; but it was not until the end of the last and the commencement of the present century that the various metastases and pathological relations of rheumatic affections received even a partial notice.

4. I. DESCRIPTION.—Various forms of rheumatism have been described by authors, or, rather, several states of disorder, more or less intimately allied to each other, have been ranked as varieties of this disease, although certain of them might have been placed, with greater propriety, under a different category: thus the pains in a limb or limbs caused by organic disease of the nervous centres, and the sympathetic pain produced by hepatic congestion, &c., have been often mistaken for rheumatism, and described and treated as such. Since, or at least soon after, the first notice of rheumatism as a distinct disease, two remarkable forms of it have been admitted—the *acute* and *chronic*. Recent observation has recognised the varieties of the complaint and the pathological distinction between certain of its states with greater accuracy; but there has been a greater disposition also among observers to multiply distinctions than to point out alliances and pathological relations. The division most generally adopted of the forms of rheumatism has been that founded upon the severity and duration of the attack. It is almost identical with the foregoing, the term *sub-acute*

being employed to mark intermediate states of severity. If the division into *acute*, *sub-acute*, and *chronic* be not arbitrary, it is at least conventional; but it has this recommendation, that it is simple, and involves not theoretical or pathological doctrines, nor necessarily suggests ideas as to the seat and extent of morbid changes, which vary remarkably in their associations and concomitants, in different cases, and even in the same case at different periods.

5. More recently, a pathological division has been attempted, in which distinctions are based on conditions that are contingent, varying, and uncertain; and qualitative or adjective terms have been applied as distinctive of varieties, derived from the names of the tissues, which are assumed to be the seats of the particular forms of the malady; thus we have had rheumatism denominated *capsular*, *muscular*, *periosteal*, *neuralgic*, &c., the meaning implied being that the capsules of the joints, the muscles, the periosteum, &c., are the seat of disease in each of these varieties which are respectively thus designated—an assumption at the best, and requiring proof even as respects the partial affection of these tissues, as will appear in the sequel. Instead, however, of adopting a division which is more specious than real, I shall take the one already very generally employed, and which is the most convenient for practical purposes, namely, the *acute*, the *sub-acute*, and the *chronic forms of rheumatism*.

6. I. ACUTE RHEUMATISM.—*Febrile Rheumatism*.—*Rheumatic Fever*.—*Inflammatory Rheumatism*.—This form of the disease is generally ushered in with rigours, or shiverings, or chilliness, followed by increased heat, and the usual febrile symptoms of an apparently inflammatory or sthenic character. Co-ordinately, and often contemporaneously, with chills or rigours, severe pains, impeding or altogether preventing motion, are felt in the limbs, affecting chiefly the joints or aponeurotic expansions, or tendinous sheaths, and sometimes extending in the course of the muscles, &c. As febrile reaction is established, the tongue becomes furred or loaded; thirst urgent; the pulse quick, open, bounding, and full; the bowels confined; the skin hot, at first dry, but afterward perspiring freely; the urine scanty, high-coloured, depositing no sediment, and very acid; the appetite impaired; and sleep prevented by the aggravation of the pain during the nocturnal exacerbation of fever. The seat and character of the pain vary in different cases, and even in the same case in different periods. Generally, at first, the pain is confined to the large joints, as the knees, ankles, elbows, shoulders; or to the aponeurotic expansions covering the large muscles; or it extends to both the joints and these expansions, attacking them either simultaneously or in quick succession. Less frequently parts of the trunk of the body, as well as one or more limbs, are so severely affected as to render the patient helpless and almost motionless. The pain, according to its situation, is most acute, severe, plunging, tearing, burning, gnawing, girding, tense, or lacerating; it is more or less constant, but exacerbated at intervals, and during the night, and by the slightest movements of the affected parts, or even by touching or pressing them, so that the pressure of the bed-clothes is hardly endured.

* "SI HIPPOCRATEM, GALENUM, ARETÆUM, PAULUMQUE ÆGINETAM GRÆCOS, SIVE CÆLSEM, AURELIANUMQUE SCRIPTORES ROMANOS accuratè evolueris, quod hunc morbum indubitatè designat, nihil dilucidè enodatèque descriptum invenies. PLINIIUS (l. xxii., 47, 68; l. xxv., 39, 47) quidem Rheumatismum nominavit, morbum eo nomine non omninò attigit. Sunt tamen apud eos loci, qui tamen invalidum quasi obiter indicant, quippe qui cū *πρὸς ὀστέα καὶ δυνάμεις περπατῶν*, et alia huiusmodi nominantur. Quæ res quidem, hunc morbum antiquioribus nec prorsus ignotum fuisse, nec dum tam frequenter, quàm hodie, ob oculos venisse, nobis planè demonstrat."—(J. Copland, De Rheumatismo, 2vo. Edin., 1815.)

When the joints are chiefly affected, the acute pain is often followed by increased heat, and after a time sometimes by an erythematic blush of inflammation, but more generally by swelling, rendering the joint fuller, rounder, and more manifestly swollen. The swelling is owing either to serous effusion and capillary fullness of the cellular tissue external to the fibro-serous tissues of the joint—the chief cause of it in acute rheumatism, or, more rarely, to serous effusion within the cavity of the joint, which more frequently occurs in the sub-acute form of the complaint. Neither the redness nor the swelling is followed by suppuration, unless in cachectic or scrofulous habits of body, and even in those not until erosion or ulceration of the cartilages of the affected joint takes place—an event most probably produced by changes in the fluid effused into the cavity during low grades of vital power or reaction.

7. In acute rheumatism, the fever is sthenic or inflammatory, more in appearance than in reality, and generally presents the usual concomitants of this fever, with remarkable severity of pain, which is always disposed to shift its place; this disposition even being the greatest, or occurring most frequently, when the exacerbation is the most severe. All the febrile symptoms, and even the pain itself, manifest more or less of a *remittent* character. This circumstance is of importance as respects both the nature and the treatment of the malady. The pulse is excited, broad, open, bounding, compressible, and sometimes full, varying commonly from 84 to 100 during the day, but rising generally to 96 or even up to 112 during the night. In some cases slight chills usher in the evening exacerbation of fever, and occasionally the symptoms are more severe on alternate days, especially in some localities. The veins are generally full, and blood taken from them furnishes a firm coagulum covered by a firm, thick, buffy coat, which, by its contraction from the circumference, renders the upper surface of the coagulum more or less cupped. This state of the blood continues, notwithstanding the frequent repetition of blood-letting, the coagulum becoming smaller in relation to the amount of serum. (*See* § 60, *et seq.*)

8. The secretions are all impaired or changed at the commencement. The tongue is either loaded or furred, or both; the mouth is clammy and dry; and thirst is generally experienced and increased during the night. The bowels are confined, unless fecal accumulations have formed from neglect, when they may become loose from the irritation thus produced. The urine continues scanty and high-coloured until the febrile action begins to subside, when it deposits a copious sediment, of a brownish-red colour, resembling brick-dust. The skin is dry at first, and generally continues dry during the day and early part of the night; but as the nightly exacerbation of pain remits towards morning, the skin becomes moist, and a profuse perspiration breaks out, but without any remarkable or permanent alleviation of the pain. The perspiration is generally unctuous, emitting a peculiar acid odour, and continues profuse for a considerable time, especially if the patient is placed between blankets or partakes freely of warm diluents. In this case the perspiration may throw out a miliaary eruption on the skin.

9. These symptoms, if not affected by a perturbing treatment, or if no internal metastasis occur, generally continue about fourteen days, or even longer, when some mitigation of their intensity occurs. Although the pains have subsided, still the patient feels them when he moves the affected parts, and they generally return, but in a less severe form than before, during the night. The parts affected, even when the pain has disappeared, continue very weak, and the patient is indisposed to use them, from a feeling of inability to exert them. The frequency of the pulse and the other symptoms subside; the urine is more abundant, paler, and more turbid on cooling, and deposits a sediment; but the perspiration often still continues unctuous and offensive, and more or less profuse. If the fecal evacuations and biliary secretions now become copious and natural, the urine more abundant, less acid, the sediment more copious, and the sweats more free, less unctuous, and have less of an acid and offensive odour, the nightly exacerbations being more slight, or nearly disappearing, the disease subsides favourably, and debility chiefly characterizes convalescence, which is the more rapid and the less likely to be followed by the sub-acute or chronic states of the disease, or by relapse, the more fully the several secretions are restored; the cleaner and more natural the tongue, and the more completely the primary and secondary assimilating functions are discharged. If, on the contrary, the amendment stops half way—if it be arrested, the tongue continuing loaded or furred; the urine acid or scanty, or much loaded; the perspiration offensive, enfeebling, and unsatisfactory; and the pulse still frequent, this state of the disease will generally pass into the *sub-acute* or *chronic*, or into both in succession, and in either these forms continue an indefinite period.*

* The following description is more minute, as respects certain points, than the above:

"Hicce morbus ab horribilibus plerumque sensuque lassitudinis; interdum et a frigore incipit. . . . Antequam febris, aut ulla ejus indicia accesserint, ægroto plerumque per triduum quadriduumve, loca certa aliquantum dolent. Indicia tamen febris unum aut alterum diem dolores constantes nonnunquam præveniunt. Dolor, qui alios alio pacto, nec eundem eadem ratione semper occupat, febre ingravescente exacerciat. Partes tamen quibus nervi, vi movendi e voluntate præditi, suffunduntur, et cœli mutationibus objectas, potissimum infestat. Quapropter membrorum superiorum inferiorumque, ut et dorsi et cervicis musculi articuli que, maximè Rheumatismo laborant. . . . Articuli majores plerumque dolent: dolor aliàs unum et alterum, aliàs plures quoque angit; nec in articulos solum, verum etiam in musculos aponuroscosque tendinosos imperium exercet: movendo adæquetur: et partis dolentis rigiditas sentitur. In hoc morbo dolor nunquam constans, nisi ubi nulla nec minima quidem febris calore comitata adsit: nec eo tempore nisi quandam certum locum obtinet. Verantamen, ut notæ febris augentur, huc illic ex alio in alium per musculos locum transiunt dolores, alium ex alio appetentes, et unde exort, eodem recepti domicilium figunt suum.

"Febris ejusque habitus huncce morbum comitans, sub vesperem ingravescit; dolor per noctem pene opprimit, quo tamen tempore sedem mutare assolet. Nec verò dolor semper nec pyrexia se invicem ex æquo subsequuntur: signa enim febris, ut e plurimis exemplis liquet, nequaquam augeri videntur.

"Inter ægotandum sudores sæpè partes, rari quidem et rarò totum perfundunt corpus; nec sublevant angorem nec *æpiav* proferunt; verum enimverò dum cæterum corpus multo perfunditur sudore, pars, quæ dolet, sæpenumero siccescit; sæpè tamen inter morbi discessionem, articulus discruciatu sudoribus plurimis suffunditur. Postquam dolor aliquandiu duraverit, pars corporis parùm sincera tumescere, nec ita multò post, rubescere incipit. Plurimum tamen tumoris sub specie œdematosa

10. ii. SUB-ACUTE RHEUMATISM.—*Rheumatismus sub-acuteus*; *Semi-acute rheumatism*, *Rheumatismus semi-acuteus*, FOWLER.—This variety of the disease may be merely a sequence of the acute, or it may occur primarily. In either case it is a state of disease intermediate, as respects severity, duration, &c., between the acute and chronic, the term sub-acute being used conventionally to mark the grades or phases between the more extreme forms of the complaint. When the sub-acute state appears primarily, it is very seldom ushered in by either chills or rigours; nor is it attended by well-marked fever, unless at night, when more or less often, only a slight degree of fever and heat of skin are experienced, generally commencing in the evening and going off with perspiration in the morning; and during this febrile period the pains are generally most severe. The pains are felt in either the extremities, the trunk, or head; most frequently at first in one limb, and then in another, or in two or more joints of the same limb; as the knee and the ankle, or the elbow and wrist; more rarely both knees, or both ankles, or elbows. In some instances the pain flies from one joint to another, affecting different articulations, or aponeurotic expansions, in quick succession, as at an early stage of acute rheumatism; but in other cases it is stationary for some time, either in the joint or the limb, or the part of the trunk in which it is either at first or soon afterward seated.

11. This form of the disease, although differing from the acute, chiefly in the mildness of the symptoms generally, is not altogether without fever. During the evening and night, the pulse generally rises from 70 to 80 or 90 beats, becoming also fuller and broader, and the heat of the skin is increased. During the night thirst is often complained of, and the mouth is somewhat dry and clammy. The tongue is white, or loaded, or furred. The alvine excretions are scanty and morbid; the urine is scanty, dense, high-coloured, very acid, and deposits a pink or brick-dust sediment. When the patient falls asleep, or towards morning, the skin becomes covered with a warm unctuous perspiration; and he is remarkably susceptible at all times of cold, even when he is hot in bed; and if he be at all exposed to currents of air, the pain often is aggravated, or it shifts its seat, or the joints become more stiff and painful. Although the bowels may not be remarkably costive, the biliary secretion is seldom healthy, the liver evincing more or less torpor, with retention of the secretion in the ducts and gall-bladder.

sine ullo rubore, frequenter adest. Partes, in quas rheumatismus acutus imperium exercet, semper dolent, tactumque refluunt. Inflammatio tumorem, de quo meminimus, subscuta, hanc exiguum doloris partem sæpè submovet. Sub hac forma statque, licet morbus in circiter decimum quartum diem durat; nec exempla desunt, in quibus modo in alteras aut etiam paulò amplius extenditur, modò plures undinas superat.

"*Termination.*—De illa Rheumatismi acuti forma, quæ felicissime decedit, nihil est, cur multum moremur; autem observandum est febris indicia, plerumque sub diem decimum quartum sensim decrescere: dolorem ipsam obtusiorē et constantiorem factum minùs mordere: unum et alterum articulum tantummodò afficere, et paucis post diebus ex toto quiescere: hoc pacto Rheumatismum nonnumquam, sæpè febrem ultrò desinere. Dolorem, nullà medicorum ope adhibita, rariùs abire: in uno et altero etiam exemplo dolorem febremque sub idem tempus inveniri desinere: illum autem febris signa longè frequentius subsequi."—(*J. Copland, De Rheumatismo, p. 7-9.*)

der. The appetite is somewhat impaired, and digestion slow or difficult, and attended by flatulence. Even when the patient is able to move about during the day, the aggravation of the pain, and the presence of fever during the night, may be such as to deprive him of sleep, or to allow him only broken slumbers, especially towards morning, for a long or indefinite time—generally for a period prolonged beyond that of acute rheumatism, or for several weeks. At last the disease is either subdued or it lapses into the chronic, but it is rarely superseded by an acute attack.

12. Sub-acute rheumatism is seldom accompanied by redness of the affected part. More frequently there are heat and swelling; often swelling without marked heat of the part; and then the patient complains of stiffness, and even of coldness of the joint. It is not often that more than two parts are simultaneously affected with this form of the disease, and it is more fixed in a part than acute rheumatism, and is much less disposed to metastasis. It is often, however, remarkably obstinate, and seldom evinces any disposition to amendment until the excretions are improved and the tongue becomes clean. In this form of rheumatism, also, the blood taken from a vein is often more or less clotted or covered by a buffy coat.

13. The *sub-acute* is one of the most frequent forms in which rheumatism occurs in the *dark races*, whether in the eastern or in the western hemispheres, the disease rarely assuming in them the truly acute character. It is one of the most prevailing diseases among the natives of the various countries of the East, and among the native troops in the service of the East India Company. The symptoms and progress of this form of the complaint are the same in these races as they have been now described. Mr. MALCOLMSON, whose remarks on this disease, as observed among the sepoys, are very instructive, states that "the pains are worse in bed; but, whatever may be the case in Europe, it is not the heat of the bed-clothes that causes this, as they come on frequently when the sun gets low, and continue for the early part of the night." This remark confirms what has been stated above, that the exacerbations of the pain are intimately associated with the return or aggravation of the febrile symptoms; this connection admitting of a ready explanation when the causes of the disease come under consideration, especially those which are dependent upon locality and climate.

14. iii. CHRONIC RHEUMATISM.—*Rheumatismus Chronicus*; *R. Diuturnus*; *R. Longus*, Author.—This form of the disease may follow either the *acute* or the *sub-acute*, these gradually lapsing into the chronic state; or this last state may be the primary disease, proceeding directly from the causes usually producing either of the forms of the complaint already described. I have remarked that the term sub-acute is merely conventional, and is intended to convey the idea of some intermediate state between the acute and chronic; hence, while it may be difficult to distinguish between the acute and sub-acute conditions in many cases of the disease, it may be equally difficult to distinguish many instances of the chronic from the sub-acute. There cannot, owing to the nature of morbid actions in relation to peculiarities of

constitution, be any line of demarcation drawn between either. If it were possible to Daguerreotype disease, the likenesses even of the same malady, taken in the numerous cases and phases in which we observe it, would hardly furnish two or three of them quite alike, however numerous might be the portraits obtained. How strenuous soever may be our endeavours to state the truth—to describe with accuracy phenomena which vary not only in different cases, but even also in the same case at different periods—we can only approach to the truth; and, even to make a tolerable approach, numerous circumstances, states, changes, and things must be mentioned, which to the superficial and unthinking may appear unnecessary or irrelevant. The terms *acute*, *sub-acute*, and *chronic*, in relation to rheumatism, must not be viewed as marking either *dynamic conditions*, or *peculiarity and limitation of seat*, or *duration of disorder*, local or constitutional, or certain *qualifying properties*; but these collectively, in connection also with *grades of severity*, between which grades, thus associated, and otherwise *variously complicated and characterized*, no line of demarcation can be drawn, however minute and conventional may be the subdivision; each state, condition, variety, or form insensibly passing into that which is the nearest to it in the scale of morbid action or structural change.

15. *A.* When chronic rheumatism succeeds to the *acute* or *sub-acute*, the febrile symptoms attending these forms have subsided, and with them the severity of the pain. The secretions and excretions, especially the alvine, have, however, not returned to a natural or healthy state; and the tongue and mouth are generally dry and clammy in the morning, the former being also more or less loaded. The pains* in the limb or joint assume more of an aching, gnawing, or boring character; and sometimes, instead of being aggravated at night, as is most frequently the case, they are often relieved by

the warmth of bed. They are commonly now more fixed and continued, or less remittent, but much less severe, and are most frequently experienced in the shoulder, elbow, knee, and ankle; in the occipital or cervical region, in the lumbar or dorsal region, and in the ischio-gluteal region, in the wrists, and in various other parts, according as they may have been most affected previously, or exposed to external causes. Frequently, however, the pain remits in the morning or during the day, and returns with evening or night; but this, in some measure, depends upon the causes or circumstances of the case. If the part had previously been the seat of increased heat, redness, or swelling, these, especially heat and redness, have entirely disappeared before the chronic state had supervened, although slight swelling may still remain. As the disease continues, the pains generally abate or intermit; exacerbations, or returns of them, occurring frequently from vicissitudes of temperature, weather, or slight exposures. The parts, however, still remain for some time stiff or weak, especially if the biliary and intestinal secretions be scanty or disordered.

16. *B.* When chronic rheumatism appears *primarily*, and often, also, after acute or sub-acute attacks, there is neither redness, nor increased heat, nor swelling of the affected part; sometimes there is even greater coldness than natural. The pain is dull, aching, or gnawing; often but slight, generally increased on motion, and attended by a feeling of weakness of the part. Frequently it is described as gnawing, boring, or merely a soreness, seated deeply, and affecting the bones. It is often remittent or intermittent; but it is often also continued, or almost constant, for a time. When it presents the former states, it is generally mitigated or removed by the warmth of bed, especially in the morning, and by a free perspiration. In some instances the pain is slight, rarely becoming severe; but, although slight, it is attended by pain on motion, or a feeling of weakness, or inability of motion when first attempted; and yet, when the attempt is made energetically, and continued so as to accelerate the circulation and promote a free perspiration, the pain is relieved or altogether removed for a time. When chronic rheumatism is thus primary, it is generally alleviated by pressure and by warmth; and it most frequently attacks, unless in cases where currents of cold air or other causes have acted directly on the affected parts, those joints or places which had previously been the seats of dislocation, contusions, or other serious injuries.

17. *C. Chronic Rheumatism of Joints; Chronic Rheumatic Arthritis; Chronic Rheumatic Gout.—Arthrodynia, CULLEN.—Rheumatic Nodosities of the Joints, HAVGARTH.*—The causes of rheumatism, when acting chiefly upon a joint or extremity, often occasion a chronic state of the disease remarkable for its obstinacy, and often serious as respects the consequences. After exposure to cold and humidity, or to currents of cold, humid, and miasmatic air, a joint, especially the knee-joint, the ankle, the hip-joint, elbow, or shoulder, is attacked by a sense of gnawing, aching, of soreness, fulness, stiffness, and an incapacity of moving without acute pain, or an increase of these feelings. The

* "Dolor obtusè angit: movendo exardet: articuli ipsi obtusum et perpetuum molestiam sentiunt: frigent: neque cætero corpore sudoribus diffulente, sudant: sin sudent, sudoribus frigidis et tenacibus perfunduntur. Verùm in eodem loco dolor plerumque constat, frigore multum adactus, calore vel tepore quoque luminatus: præsertim si lecto aeger recumbat. Rheumatismus longus premendo levatur, degravatur acutus."

"Longus plerumque maximos corporis articulos, humeros scilicet et coxas, nec dorsum rarò invadit: Quum his in corporis partibus aliquamdiu permansisset, in alias transit. Pars, quæ doluerit, morbo amoto, imbecilla et rigida perdiu manebit, et in superiorem dolorem, cœli si intemperies quidquam moveat, faciliè incidit. Rheumatismus etiam longus, statas remissiones si excipias, aliquot menses, vel annos, immo et maximam vitæ partem, hoc pacto excurabit."

"Partes dislocationibus, luxationibus et contusionibus antea laborantes, vel prioribus agrotationibus debilitatas, partibus antea integris prætermittis, infirmare solet. Rheumatismus dorsi coxæque musculos aggressus, ne amoveatur, multum renititur, et tunc quidem sexum masculinum quàm muliebri sæpiùs aggreditur."

"Dici non potest ut longus in acutum permutetur. Quidam, qui istuc sæpiùs incidit, ibique diu laboraverint, ad articuli hydropem sæpè perveniunt. Manifesta quidem res est, membri imbecillitatem affecti, et remissionem exhalentium quæ in ligamenta capsularia ferant, nec necessariam inde exortam eam excitare. Hydrarthrum quoque in serofulosorum articulis sæpè gignit. Rheumatismus prælongus prægravisque articuli ἀγχρωσιν nonnumquam afficit."

"In sectis horum cadaveribus, qui diu sæpiùsque hoc morbo laboraverint, quique eodem (qui quidem perpauci sunt) obierint, articularum membranae crassescunt et adherescunt: quasi glutinamentum tendinum thecis infunditur."—(*Op. cit.*, p. 10-13.)

complaint generally continues for weeks, and, if neglected during this time, often for months, either without alleviation, or becoming much worse; the patient ultimately being unable to extend the affected limb, at least without extreme pain. The soreness, stiffness, and pain generally extend from the joint, along the fibrous structures, to a greater or less extent, the limb thus becoming the seat of severe pain. This form of rheumatism may continue for months, and at last give rise to disease of the cartilages of the joint, and its usual consequences. One of these is absorption of the cartilages, and the deposit of a smooth, ivory-like substance. Dr. CRAIGIE observes that, although this form of the disease commences in the aponeurotic expansions, it is disposed to pass from these to the periosteum, and to produce chronic morbid action both in it and in the interior of the articulations. This action occasions the removal of the synovial membrane and cartilages, and deposits in their place a porcelain-like substance, polished, but devoid of the elasticity of cartilage and of secreting power.

18. This is one of the most common forms of the rheumatic disease. It has been most ably treated of by Dr. TODD. Mr. ADAMS has denominated this affection "*Chronic Rheumatic Arthritis*," and has given a minute description of the lesions produced by it. Dr. COLLES, Mr. WILMOT, Mr. CUSACK, Mr. R. SMITH, and M. CRUVEILHIER have also devoted much attention to this very important form of chronic rheumatism. Dr. TODD justly remarks, that this affection of the joints, even when most severe, rarely causes immediate destruction of the articular textures: supuration or ulceration seldom occurs, and when they do, he thinks that they proceed from a venous inflammation coming on in the course of the disease. The joints, however, do not always escape without serious change; for not only may the disease run on, uninfluenced by any mode of treatment, but exertions of the limb, and the painful use of the affected joint, may induce inflammation in its usual form, if it had not even previously existed, and all the effects which commonly follow it.

19. The immediate effects of the rheumatic complaint are commonly confined to the ligament of the joints, to the periosteum of the articular ends of the bones, and to the tendons of the muscles inserted into them; but these effects sometimes extend to the fibrous fascia. These textures, as Dr. TODD very correctly observes, become thickened, lose more or less of their natural flexibility, and I may add that they are impaired in their tonicity and vital cohesion. They are also more opaque. The synovial membranes are also thickened, evidently by an effusion of lymph in the synovial areolar tissue. In some cases the affection of the joints is followed by effusion of fluid into the synovial cavities, the pain being aggravated by pressure, but more by motion. If the effusion be moderate, it may alleviate the pain; if it be very great, the pain is chiefly the result of distention, but is then rarely so severe as previously to the effusion. This affection is most common and most marked in the knee-joints; but although it sometimes is seated in both knees simultaneously, it is rarely equally severe in both. Dr. TODD very justly observes that these changes are seldom the result of a single

paroxysm, but generally ensue from frequent attacks, or upon the long continuance of the rheumatic diathesis. In these respects, the analogy with gout he considers obvious. "And, although we have no evidence of such deposits in rheumatism as the chalk-stones of gout, there are abundant indications that rheumatic matter cannot be attracted to the joints in any quantity, or with frequency, without impairing, to a material extent, the nutrition of their textures." (P. 164.) Without, however, disputing at this place the existence of a "rheumatic matter," the alternative of a modified vital action—a morbid or altered condition of organic nervous influence and sensibility, and a consequent change of vascular action and of nutrition—ought not to be left entirely out of view.

20. The change of the articular cartilage, which I have briefly noticed above, is very fully described by Dr. TODD, who states that it consists of a process of absorption, taking place slowly, during the commencement of which this tissue appears to divide into a number of fibres, vertical to the surface of the bone. This change resembles that produced by long maceration of articular cartilages; and depressions or grooves may be seen which gradually enlarge, unite, and leave portions of the bone uncovered. As the articular surfaces of the bones are thus deprived of their cartilaginous coverings, the pressure and friction sustained by them cause them to assume a smooth and polished surface and appearance, resembling that of very dense polished ivory. While the absorption of the cartilage, and the consequent change in the articular surface of the bones are proceeding, the bones themselves near the affected joint become enlarged, chiefly by an exuberant ossific deposit around and near to the articular extremity, causing both some deformity and a mechanical obstacle to the movements of the joint. These osseous deposits are seen irregularly about the joint, and vary in shape and size. The alterations in the synovial membrane are also remarkable. This membrane is thickened and prolonged at various points into fringes or villous processes, which are soft, and of a red colour, and dip into and completely occupy depressions around the neck of the bone. Small cartilaginous bodies, of an irregular shape and size, are sometimes found in rheumatic joints. They are either loose in the cavity of the joint, or attached by pedicles formed by the synovial membrane to the inner surface of the ligaments or to the articular surfaces. These changes cannot, I conceive, be ascribed to inflammation, but rather to a morbid nutrition, consequent upon altered organic nervous sensibility and influence in the joint, and upon the morbid state of the synovial secretion.

21. This disease of the joints, generally consequent upon prolonged and repeated attacks of chronic rheumatism, is most prominently manifested in the hip-joint; and, as occurring in this situation, it has been described by SANDFORD, BOYER, B. BELL, and more recently by Mr. ADAMS, Mr. R. SMITH, Mr. CANTON, and Dr. TODD; but, as the last-named writer remarks, this disease does not spare any of the joints. It affects all the large joints; and it has been met with in the hands and feet, in the temporomaxillary joints, and in some of the vertebral articulations. It may show itself in early

life, as well as at more advanced periods; but it is most common after thirty years of age, and among the labouring poor who are much exposed to vicissitudes of season and weather.

22. This form of the disease may affect several joints, but whether one or more joints, it is more rarely even remotely consequent upon acute or sub-acute rheumatism than upon repeated attacks, or it has followed several returns of the more chronic affection. The painful symptoms characterizing this form are aggravated at night, and by vicissitudes of weather, especially by easterly winds, by cold and humid states of the air, and by derangement of the biliary and digestive organs; and they often extend to adjoining parts.

23. When the *hip-joint* is the seat of this disease, both the acetabulum and the head of the femur become altered in shape, the former being deeper and wider than natural, the latter being flattened and expanded, and assuming a turnip-like shape, or being lengthened into the form of a cone. "Both surfaces are deprived of cartilage; the fatty body, which in health occupies the non-articular portion of the acetabulum, and the ligamentum teres, disappear; and the eburnation is apparent to a greater or less extent over both articular surfaces. There is more or less of the exuberant osseous growths around both the acetabulum and the head of the femur; but the most remarkable feature is, that the neck of the femur is shortened, so that the position of its head with respect to its shaft is sometimes considerably altered. So remarkable is the change in the general shape of the upper extremity of the femur, that a bone thus altered has been not infrequently mistaken for an example of united fracture of the neck of the femur." (TODD, p. 174.)

24. In this disease of the hip-joint the affected limb is much shorter than the other, and the patient appears lame. Sometimes he merely rests the toes on the ground; and if he comes down on the sole, he appears the more lame. The foot is wasted, as in fracture of the neck of the femur. As rotation is so painful as to be almost impossible, walking is attended with circumduction of the pelvis with the affected limb, the muscles of this limb being more or less wasted, and the nates of the same side flattened. The weight of the body on the affected joint occasions much pain in it; while the reclining posture affords ease. Mr. ADAMS states that this disease, when fully established in the hip-joint, rarely or never extends to the other articulations, and doubts its rheumatic origin in some instances. Dr. TODD remarks, that in some of the cases traces of rheumatism have not been apparent in the previous history; but that he has not himself met with a case in which complaint has not been made of pains of a rheumatic character in some of the other joints, although further signs of disease of the articular textures were wanting. Mr. ADAMS admits that this disease may have a rheumatic origin; but that falls on the great trochanter often give rise to the first symptoms. This, however, is no proof of the independence of the disease of the rheumatic diathesis; for the fall may be only the exciting cause or determining agent of the local affection. This form of rheumatism of the hip-joint attacks much more frequently the male than the female sex; while

chronic rheumatism of the hands most frequently affects females.

25. Chronic rheumatism of the hands often produces much deformity of them. All the joints are liable to be affected, and the fingers are generally most deformed. "Besides the wearing away of the cartilages, the ossific growths, and the ivory-like surfaces, the joints become dislocated, and the fingers are drawn more or less out of their natural position; they are generally drawn forcibly over towards the ulnar side of the hand, overlapping each other, the innermost fingers being in a state of flexion." The extremities of the metacarpal bones are often much enlarged, and the carpus preternaturally convex in the dorsal aspect, owing to thickening or distention of the synovial bursæ. Both hands are generally affected, and sometimes, also, other joints. Dr. HAVGARTH states that the disease is almost peculiar to women, and commonly appears about the period of the cessation of the menses. Out of thirty-three women in whom he observed it, only three had it during the period of regular menstruation. It first appeared, in most of the cases, between the ages of fifty-one and sixty; he observed it only in one man. (See *Op. cit. on Nodosity of the Joints*, p. 152.) I have, however, seen three instances of this affection of the hands in females between the ages of thirty and forty-five, and in all these the catamenia were irregular, generally scanty and difficult.

26. IV. OF THE LOCAL AND STRUCTURAL STATES, OR THE SPECIAL SEATS OF ACUTE AND SUB-ACUTE RHEUMATISM.—It has been ably contended by Dr. F. HAWKINS, and more recently by Dr. MACLEOD, that rheumatism presents certain differences, according as it is seated in the *fibrous* or in the *synovial tissues*. Dr. HAWKINS thus distinctly states this doctrine, and in so lucid a manner as to deserve especial notice. In the *first class* of tissues, he ranks, 1st: Those which serve to connect parts together, as the tendons and ligaments, and the aponeurotic expansions of tendons; and, 2d. Those which divide and envelope particular organs, as the muscular fasciæ and enveloping aponeuroses; the periosteum; the fibrous coats of the nerves; the membranes which have on one side a serous lining, as the dura mater and pericardium; also the fibrous sheaths of the tendons and capsules of those joints which are provided with fibrous capsules, and the ligaments surrounding other joints; and the membranes which have a mucous covering spread over them, &c. In the *second class* he includes, 1st. The sub-cutaneous bursæ, to which the epithet *mucosæ* has been improperly added; 2d. The synovial sheaths of the tendons; and, 3d. The synovial capsules of the joints.

27. A. In the *first class* of structures the fever and constitutional disturbance are much greater in proportion to the degree of local inflammation than in the other; and Dr. HAWKINS considers that the heart and pericardium are chiefly prone to sympathize with the affection of the fibrous structures.

28. B. Rheumatism of the *second, or synovial class* of textures, is indicated by the situation, the degree, the character, and the form of the swelling, which is much greater, and occurs earlier, than that which is caused by rheumatism of fibrous structures. The swelling in

rheumatism affecting chiefly the synovial membrane is that of a circumscribed fluctuating tumour, modified by the surrounding ligaments. There can be no doubt of rheumatism being more acute, and more disposed to associate with it disease of the heart, where the fibrous tissues are its chief seat, than where the synovial structures are chiefly attacked, in which latter case the disease usually assumes a sub-acute form.

29. Dr. Todd remarks, that "some practical physicians have endeavoured to make a distinction between what they call synovial or bursal rheumatism and fibrous rheumatism. The natural history of the disease, however, does not warrant this distinction; for in no instances of rheumatic fever are the synovial membranes free from irritation, as evinced by the existence of effusions; and the synovial membranes can scarcely be affected without involving the fibrous tissues which surround, support, and convey the blood-vessels to them." There is certainly much truth in this remark; yet the distinctions made by Dr. HAWKINS are not without some foundation; for, although there is generally an extension of the morbid action from one tissue to another, or even co-ordinately to both, in some instances, nevertheless there is often a predominance of it in the one over the other. Viewing the rheumatic disease as altogether constitutional, although expressed more especially in particular structures, it cannot be denied that the disease assumes a more acute form, and peculiar and even more extensive associations, when predominating in non-secreting fibrous tissues, where no portion of the *materies morbi*, admitting this to exist, is effused, than when chiefly affecting a secreting surface allowing the effusion of a portion of the fluid, which fluid, when retained in the circulation, probably serves to aggravate, perpetuate, or even to complicate the attack; but, when effused, tends chiefly to aggravate or perpetuate the local affection.

30. That the fluid which is effused in the cavities of joints, during acute or sub-acute rheumatism, abounds in materials of an injurious tendency if they were retained in the blood: that it contains more of a morbid material than in some other circumstances, is manifested by the sensible qualities of the secretions and excretions generally in this disease; and it is by no means improbable that the morbid effusion, especially when long retained in the cavity of the joint, and thereby rendered still more morbid, exerts an injurious effect upon the synovial membrane, upon the cartilages, and even upon the capsules and more external structures of the joints. One of the great errors of modern writers on rheumatism is the attempt to ascribe its several forms to a special affection of certain tissues; to view the several varieties of the disease as resulting from their respective local affections; to consider a local and contingent manifestation of a constitutional malady as the malady itself, a local manifestation which is always various, constantly varying, differently associated, often singularly complicated, and which, however severe in any of its seats or complications, is the painful result of pre-existent morbid conditions of a much less sensible and obvious kind; the local and more external expression of a constitutional malady to which

our pathological investigations, as well as therapeutic indications, should be more particularly directed.

31. When the *synovial membrane* of the joints is the chief seat of acute or sub-acute rheumatism, the symptoms are not so acute, but more persistent than when the fibrous tissues are mainly affected. Although two, three, or more joints may be at first attacked, a more limited number, or only one, becomes the principal seat of the disease, and the effusion into the joint is often increased. It is extremely probable that the fluid then effused is not merely an increased quantity of synovia, but that this fluid is more or less altered from the healthy state, which alteration is increased by the retention of it in the affected joint. To this circumstance, and to the irritation thereby produced in the retaining and surrounding tissues, are to be imputed not merely the obstinacy and aggravation of the complaint, but also the structural changes in the capsule, in the cartilages, and even in the ends of the bones themselves, with the inflammation which either attends or follows those changes, especially in scrofulous, cachectic, or broken-down constitutions. When the effusion is within the capsule, there is more or less projection, owing to distention, of the more yielding parts, as shown when the knee-joint is affected, the swelling being more limited than when the more external parts, as the ligaments, tendons, and aponeuroses, are the chief seat of the disease, and often fluctuating; this phenomenon never occurring unless the effusion is within the capsule.

32. I have seen this form of rheumatism most frequently in the knee-joint. In more recent and in the more sub-acute cases, the structural changes produced by the disease may not extend much beyond an increased quantity of synovia, and more or less vascular injection and thickening of the capsule, especially of the synovial membrane. In a case alluded to by Dr. MACLEOD, which terminated fatally from another disease while subject to a first attack of this form of rheumatism, the alterations in the joint were very similar to the above. When, however, the attacks have been frequent, or when the disease has been persistent, or the constitution in fault, or when the patient has aggravated the attack by exertion or exposure, the changes in the capsules, the ligaments, the cartilages and the ends of the bones are much more serious, owing to superinduced inflammation and the contingent consequences, as respects not merely these parts, but also those more external to the capsule and in the vicinity. That suppurative disorganization of the joint is sometimes met with during, or consequent upon, acute or sub-acute rheumatism, cannot be denied; but there is great reason to infer that the inflammation, of which the disorganization is the effect, has been superinduced, as just stated; and that that issue is not limited to rheumatism attacking the capsule or more internal tissues of the joint, but is occasionally extended to those cases in which it is difficult to determine whether or not the amount of the rheumatic affection was greater externally or internally to the capsule. In two cases, in private practice, attended by Mr. FERGUSON and myself, supuration of the knee-joint supervened; but this result was owing to the operation of the causes

of inflammation subsequently to, or at least during the rheumatic attack, to unusual exertion of the affected limb, and to exposure. This termination of acute or sub-acute rheumatism of the joints should not be confounded with the *suppurative disease of the joints*, which is secondary of phlebitis, and which is not infrequent in females after delivery.

33. *C. Rheumatism affecting chiefly the Periosteum.—Periosteal Rheumatism.*—This state of the disease usually presents itself in a sub-acute or in a chronic form, more especially the latter; and is met with most commonly in impaired constitutions, in the cachectic, and in the scrofulous. It affects those parts of the periosteum which are most exposed to the vicissitudes of temperature and weather, as those covering the tibia and ulna, the sternum, the cranium, and bridge of the nose. The disease is either attended by a slight degree of fever and aggravation of the pains at night, or is prolonged indefinitely in a chronic and non-febrile state. The pain is dull, constant, deep-seated, and referred to the bone. It is unattended by redness or evident swelling; but sometimes a slight fulness or thickening may be perceived upon a careful examination, and the pain is increased by firm pressure. The tongue, in these cases, is either loaded or furred, and the excretions are more or less disordered. The pulse is generally accelerated, often weak and compressible. That more or less thickening of the periosteum actually takes place, has been demonstrated on dissection of some of these cases. Dr. HAWKINS remarks, that this form of rheumatism is often allied with deep-seated pains, which sometimes continue fixed in the shoulder, and occasionally affect the hip. They are aggravated by any motion in the joint in any direction; which renders it probable that the fibrous capsules with which these joints are provided are here the seat of pain, and these capsules are closely interlined with the periosteum.

34. It is often very difficult to distinguish rheumatism affecting the periosteum from pains occasioned by *syphilis* or by the abuse of *mercury*. The previous history of the case should guide the diagnosis; but it may be inferred that the affection is rheumatic when the pains and the periosteal affection are decidedly local, or confined to a single limb, or to defined portions of one or more limbs. Whereas the pains from the other causes now assigned are more dispersed or wandering, affect a greater number of places, and are seldom confined to one part until nodes are being, or have already formed. The nocturnal exacerbations are also much more severe when the disease is syphilitic than when it is rheumatic; and they moreover are generally associated with other signs of secondary syphilis. If the pains have been produced by the abuse of mercury, the swellings or enlargements of the periosteum are more remarkable, more numerous, and more defined than when the disease is rheumatic.

35. *D. Rheumatism may affect chiefly the Fibrous Envelopes of the Nerves.—Neuralgic Rheumatism—Rheumatism of the Nerves.*—This form of the disease is met with in the rheumatic diathesis, from the same causes as produce rheumatism, and often in alliance with rheumatism of other fibrous structures. Yet, although pains following the course of certain nerves, and pro-

duced by exposure to cold, may be viewed as being very closely allied to rheumatism, they should not be viewed as being altogether identical with it; but, in many instances, as more intimately connected with neuralgia or with neuritis. Nevertheless, the connections of these pains with either may obtain in different cases, the one affection passing into the other by insensible degrees. Neuralgic rheumatism is observed chiefly in the *sciatic nerve* and its branches. The attack generally commences in the loins, affecting one side chiefly or solely, extending down the corresponding limb, and occasionally reaching the foot. It occupies the posterior aspect of the limb, and follows the course of the nerve. The suffering is generally very severe, and is commonly increased at night; but it is seldom so distinctly periodical as neuralgic affections are; nor is the pain so sudden in its invasion and cessation, nor so transient as that of neuralgia. The symptoms often resemble those of incipient ulceration of the cartilages of the hip. (*See articles NEURALGIA*, § 35, and NERVES, Affections of.)

36. Neuralgic rheumatism is sometimes seated in the nerves of the face, usually in consequence of exposure to currents of air; is often associated with other rheumatic complaints, and sometimes even alternate with rheumatic affection of the sciatic or other nerves. This form of rheumatism is often attended, at its commencement, by a foul or furred tongue, by acceleration of pulse, by disorder of the secretions and excretions, and by bilious congestions or accumulations. It may present a *sub-acute* character; but it is most frequently *chronic*, and often very prolonged, being of several months' duration.

37. *E. Rheumatism affecting chiefly the Aponeuroses, Muscles, or fibrous Tissues of the Loins and Back.—Lumbago.*—This form of the disease may be either *primary*, or *consecutive*, or *simple*, or *associated*. When it is *primary* it is sometimes *sub-acute*, but it is more frequently *chronic*, especially when it is *consecutive* of other forms of the complaint; and in this latter case especially it is often complicated with some other form of rheumatism, as neuralgic or sciatic rheumatism. Lumbago is often confounded with other complaints; these complaints, especially congestion of the venous sinuses of the lumbar vertebrae and its consequences, congestions of the kidneys, &c., being mistaken for lumbago. This form of rheumatism is sometimes but little painful unless the muscles of the loins are called into action, more especially if the action be sudden. Owing to this remarkable increase of pain on motion, the patient either remains at rest in his bed, or on a sofa, or he walks bending forward, and is unable to raise himself quite erect.

38. When the pains in the loins are truly rheumatic, the lower limbs and joints are seldom affected; but when they depend upon congestion of the venous sinuses of the lumbar vertebrae, or upon congestion of the kidneys, there are, in addition to more marked disorder of the urinary excretion, symptomatic pains, numbness, cramps, or pricking, or lancinating pains in the limbs, usually in both limbs, when the venous sinuses of the spine are congested; and in one limb, if only one kidney is thus affected.

39. Rheumatism sometimes affects not only the *lumbar region*, but also the *dorsal portion* in some instances, and in others it apparently extends to, or has advanced from, the *ischial* or the *gluteal aponeurosis* to the *lumbar* or *dorso-lumbar aponeurosis*. It is doubtful, in these cases, whether the muscles or the aponeuroses are the seat of pain. I believe that the latter are chiefly affected, the contractions of the muscles inducing pain by stretching the affected aponeurosis.

40. *F.* There are various *other parts* of the body in which rheumatism sometimes appears, independently of those more *internal parts* which it sometimes attacks either contemporaneously with, or consecutively upon, an affection of the external structures. (See § 47, *et seq.*) Of the manifestations of rheumatism in these external parts, little notice is required at this place, as the more important topics connected with them are discussed under other heads. It is necessary only to mention what these localities are, and the usual forms in which the disease affects them.—(a) *Rheumatism of the head*—*Cephalalgia rheumatica*—*Epicranial rheumatism*.—The rheumatic affection may appear either primarily or consecutively in the head, in a chronic or sub-acute, very rarely in an acute form. It may affect either side of, but very seldom the whole head; and it may be seated in the frontal and temporal regions, or in the occiput. It appears to be seated in the epicranial aponeuroses of these situations, and not in the periosteum. (See art. HEADACHE—*Rheumatic and Arthritic*, § 29, *et seq.*)

41. (b) *Rheumatism of the Neck*—*Cervical Rheumatism*—*Torticollis*—*Crick in the Neck*.—This, as well as the preceding local form of the complaint, generally follows the action of currents of cold air, or other kinds of exposure to cold, or to cold and moisture. The pain affects chiefly either the back or one side of the neck; and in this latter case the head is held to one side, or held awry, and is always inclined so as to relieve the suffering part. The neck is sore, stiff, and incapable of motion, unless with great increase of pain. This form of the complaint is often complicated with the preceding, and is apparently seated in the cervical aponeuroses.

42. (c) *Rheumatism of the Face*—*Facial Rheumatism*—*Facio-temporal Rheumatism*.—This form may be associated with either of the foregoing, and especially with rheumatism of the head (§ 40). The pains may commence in either the temples or in the face, on one side, or in both at the same time. It is liable to be confounded with *tic douloureux*, or *neuralgia facialis*, or with toothache, with which latter it not infrequently alternates, or even is associated, the same exciting causes producing either or both. It is sometimes, also, complicated with severe attacks of catarrh, or with catarrhal fever, and, in rarer instances, it either is seated chiefly in, or extends to, the sclerotic coat of the eye, forming *rheumatic ophthalmia*. (See EYE, *Diseases of*, § 96, *et seq.*)

43. (d) Rheumatism may likewise be seated in, or extend to, the *aponeurotic investments* of the *intercostal muscles*, or these muscles themselves, according to the opinion of some writers. It has, in this situation, been usually designated *pleurodynia*, or *spurious pleurisy*,

under which head it has been considered. It may also affect the aponeurotic expansions, or fibrous tissues of any part of the *abdominal parietes*, although the disease is seldom observed in these parts. Its affection of, and metastasis to, *internal organs or structures* are considered in the sequel.

44. II. GONORRHOEAL RHEUMATISM—*Specific Rheumatism*.—Rheumatism affecting chiefly the capsules of joints and the synovial membranes not infrequently occurs in the course of other constitutional and cachectic diseases, especially *gonorrhœa*, the venereal or mercurial cachexy, or other states of general taint. It is, however, only in connexion with gonorrhœa that I have to view the complaint at this place.—a. The rheumatic affection generally supervenes upon gonorrhœa about ten days, or a fortnight, or three weeks from the first appearance of the urethral discharge, which usually is very much diminished, or has entirely disappeared, when the former is developed; and the one affection may alternate with the other, and become remarkably obstinate, especially when neglected at first, or injudiciously treated. The *cause* of rheumatism thus supervening upon, and more or less superseding, the gonorrhœal discharge, is not very manifest. The operation of the usual causes of rheumatism upon a constitution affected by gonorrhœa, and previously exhausted by seminal discharges, seems the chief source of the malady; but in some instances the exciting causes are not evident, the gonorrhœal infection both predisposing to and determining the rheumatic disease. Probably diathesis is much concerned in producing the attack, the gonorrhœa imparting the peculiar conditions by which this form of the complaint is characterized.

45. b. The *symptoms* of gonorrhœal rheumatism generally appear before the urethral discharge has altogether ceased. A severe aching is complained of in one or more joints. Of four cases which were under my care, three had the knees affected; the other the ankles, and bursæ of the adjoining tendons; but the affection was severer on one side than on the other. The pain soon becomes acute and burning, and affusion rapidly appears within the capsules and bursæ, which become much distended. The external surface is rarely or never reddened or inflamed. Motion aggravates the pain, which is much exasperated during the night, causing watchfulness. The affected limb is usually kept in a semi-flexed position, and either stretching or bending it greatly aggravates the pain. This form of the disease assumes either an *acute*, *sub-acute*, or *chronic* character, the last generally following the first or second. The *acute* is always attended by fever. In a case which I lately attended, the pulse rose above 120; but more commonly the febrile symptoms are less severe than in the usual form of the complaint, and assume more of a sub-acute character, and a truly remittent form. The tongue is loaded, the bowels confined, but not so obstinately as in other states of rheumatism; and the urine is loaded with lithates. The perspiration is copious, and somewhat offensive. Dr. MACLEOD states that the skin presents a pulverulent deposit, which may be scraped off in sufficient quantity to be tested, and which consists of the lithate of

soda. I have not observed this. In no instance which I have seen has the urethral discharge entirely disappeared, a very scanty gleety fluid still exuding from the urethra. Several surgical writers have noticed the alternation, or the succession of gonorrhœal ophthalmia and gonorrhœal rheumatism. I have seen it only in one instance. I have not met with a case in which this form of rheumatism was complicated with, or succeeded by, cardiac or any other internal affection. In one instance there appeared a slight delirium during the acute stage.

46. The course of this complaint is very prolonged, according to the usual mode of treating it. M. RICORD states that it generally continues many months. Although the more acute symptoms may soon subside, the sub-acute and chronic stages are most obstinate. Even when it has apparently disappeared the complaint is apt to recur, generally in a chronic form, the urethral discharge returning during the intervals. In this way it may continue a long time, and even induce serious organic changes in the affected joint.

47. III. OF THE COMPLICATIONS, EXTENSIONS, OR METASTASIS OF RHEUMATISM.—Rheumatism, especially in its acute and sub-acute forms, is a more or less *external* manifestation of a constitutional malady, during the existence of which *internal* determinations, also, of morbid action may appear in similar tissues and structures; or, in other words, the constitution, being affected in an acute or sub-acute form, will throw the morbid action on the periphery of the frame, without any internal complication in persons of strong vital resistance or unimpaired power; but in those of diminished energy or vital resistance, a somewhat similar state of morbid action is apt to appear in internal fibrous and serous tissues and surfaces, either contemporaneously with, or consecutively upon, the external affection. In these latter, the vital energy is insufficient either to throw off the morbid action on distant or peripheral parts, or to protect more central structures from the invasion of this action.

48. A. Of the several *associations, complications, and metastases of rheumatism*, there are none of greater importance, and of more frequent occurrence, than those in which the heart and pericardium are concerned. The *endocardium*, in certain of its reflections especially, and the *pericardium*, are particularly liable to be affected, either contemporaneously with, or consecutively upon, acute and sub-acute attacks of rheumatism—the acute more especially. Of this complication or metastasis I have fully treated when considering the diseases of the HEART and PERICARDIUM (§ 129, 132, 133), and to that article I must now refer the reader. That many cases of this *complication* present the heart as the primary seat of the disease is by no means improbable, especially in young subjects, inasmuch as I have often observed a fully developed state of cardiac affection at an early period. Dr. TOWN takes a similar view of this association of the internal and external disease, and believes that it is less frequently a metastasis than is usually supposed; and states that the occurrence of the cardiac affection “is inexplicable by the doctrine of the metastasis, which supposes that the

cardiac inflammation has been transferred from the limbs to the heart. The truth is, that the cardiac inflammation may be primary: it frequently exists at the same time with the articular affection, and dates its origin from the same period, as it derives it from the same cause.” (P. 116.) This remark is confirmatory of what I have stated at another place (*see art. HEART*, § 129), and agrees with what I shall have to notice in the sequel.

49. Dr. GRAVES even believes that the rheumatic disease may exist without its external manifestation, and that the cardiac affection may precede the articular swellings, or may exist without any disease of the joints being manifest, especially in persons who have been formerly the subjects of acute rheumatism. Such cases as these are comparatively rare; but I have met with two cases, both in fish-mongers, in which the symptoms were identical with acute rheumatism, with many of the symptoms of endocarditis, but without the external rheumatic affection. These cases were viewed and treated as internal rheumatism of the heart, and terminated favourably.

50. B. The *head* is variously affected in rheumatic cases. It may, as stated above (§ 40), be the primary seat of sub-acute or chronic rheumatism in either of the parts there designated; or it may be implicated consecutively, or in the course of either of the forms of the disease. The usual states of rheumatism of the head have been considered in the article on HEAD-ACHES (§ 29, *et seq.*, 50). But the head may be differently affected from either of the modes there mentioned. *First*, head affection, delirium, or mental disorder, in some form or other, may occur in the course of acute rheumatism, without any abatement, or with slight abatement, either of the fever or of the local disease. In these cases the head affection is chiefly nervous, and contingent upon the febrile condition, in connexion with depression of nervous or vital power. The affection of the nervous system may, however, be produced by too large or repeated bleedings, by a rapidly-induced anæmia, or by colchicum, or by antimony, or by narcotics, and other depressing and perturbing agents. In all these cases the head affection is independent of any inflammatory action within the cranium.

51. *Secondly*, the symptoms referred to the head may appear at an advanced stage of acute or sub-acute rheumatism, most frequently of sub-acute and capsular rheumatism, attended by effusion into the cavity of the joint, and is generally followed by the subsidence of the disease of the joint. In this class of cases, always the most unfavourable, and generally occurring in persons of exhausted or depressed vital powers, or of a cachectic habit of body, the head symptoms are more or less indicative of inflammatory irritation of the brain or its membranes, often passing into effusion of serum into the ventricles or between the membranes. Although the affection of the head is attended by the partial or entire subsidence of the disease of the joint, yet it cannot be conceded that the subsidence has produced the disease within the cranium. It should rather be considered that, during the course of the rheumatic disease, owing to the existing states of the nervous and vascular systems, influen-

ces acting on the brain or its membranes develop a morbid action in these parts which supersedes, or partially or entirely removes, that which previously existed in the joints; and that this form of head affection is superinduced most frequently by causes acting on the mind, or on the brain and membranes, through the media of the senses, or still more directly and locally during states of vital depression, consequent either upon the duration or intensity of the disease, or upon an injudicious mode of treatment.

52. *C. Disease of the membranes of the spinal chord*, probably commencing in, or at least implicating the theca of the chord, is occasionally observed either complicated with, or immediately consecutive of, an attack of acute or sub-acute rheumatism. A case occurred to me in 1820, in which acute rheumatism of the joints, complicated with *pericarditis*, was followed by *chorea* and inflammation of the membranes of the spinal chord, soon passing into effusion of lymph, and terminating in complete general palsy. This case was not only demonstrative of this complication and succession of local affections, and of the appearances after death (see *London Med. Repos.*, vol. xv.), but it also evinced the connection subsisting between rheumatism and inflammation of internal fibro-serous surfaces on the one hand, and between atonic spasmodic affections, *chorea*, and paralysis on the other.

53. When treating of the forms of paraplegia and general paralysis (*see art. PARALYSIS*, § 70, *et seq.*), I described certain states of that disease which depended upon inflammation of, followed by the effusion of lymph upon or between, the membranes of the spine, and which often commence in a very slight form or degree of palsy, the movements of the limbs being at first uncertain, tremulous, irregular, or spasmodic, in many respects resembling *chorea*, and gradually becoming still more imperfect, until they are altogether lost, sensation still remaining unimpaired. This affection, in rare cases, is consequent upon acute or sub-acute rheumatism, appearing as a transference of the morbid action from the more external parts to the theca and membranes of the spinal chord. I have met with five cases of this description, two of them in children under twelve years of age; and in three of the cases I had an opportunity of examining the spine after death. In all three, coagulable lymph was effused within the theca, and pressed upon the chord and origins of the nerves; and the venous sinuses of the vertebrae were remarkably congested. It ought not, however, to be overlooked that inflammation of the membranes of the chord, occasioning effusion of lymph and palsy, is generally attended by severe pain in the limbs, and a girding sensation around the abdomen, which may be mistaken for rheumatism, but which is owing to the irritation at the origins of the nerves supplying the pained muscles, and may be quite independent of pre-existent rheumatism, or of the rheumatic diathesis. (*See art. SPINE, ITS CHORD AND MEMBRANES.*) [Occasionally rheumatic inflammation attacks the intervertebral substance, ossific matter is effused, and complete ankylosis follows. Such a case recently fell under our observation in a gentleman who had long laboured under chronic rheumatism, and

who resorted to a water-cure establishment for treatment. The vertebrae of the spinal column all became firmly soldered together, so that flexion of the back became impossible, and even any motion of the head could not be executed without movement of the whole body.]

54. *D. The pleura* may be affected either in the course or consecutively of an attack of acute or sub-acute rheumatism; but not so frequently as may be expected. In one case the pleura was implicated very soon after the complication of the rheumatism with pericarditis was ascertained, pleuritis with effusion rapidly supervening. The earliest writer who noticed the internal or visceral complications of rheumatism was probably BOERHAAVE (*Aphorisms*, § 1491). He mentions the viscera in general terms, but particularizes only the brain and lungs. VAN SWIETEN, in his excellent and practical commentaries, is more explicit; although even he fails in duly recognising the frequent complications of cardiac disease with rheumatism, if, indeed, this complication was as frequent in those days as in the present, which admits of some doubt,* although certain symptoms of this complication are not entirely overlooked by him; yet, in noticing these, we are surprised that more particular attention had not been directed to the state of the heart and pericardium. It is not improbable, although such cases are not frequently detected, or are often overlooked or mistaken, that rheumatism, affecting the intercostal muscles, or the fibrous tissues in the vicinity, may extend to the pleura, and be there followed by inflammation or effusion, in

* "Verum quandoque contingit, ut materies rheumatica admodum vaga sit, et, mox externas, mox internas, partes occupet; unde tales ægri in majori versantur periculo. Aliquando enim dolor in membris disparet, oritur pectoris anxietas, cordis palpitatio, pulsus intermittens, et, redeunte ad membra dolore, hæc symptomata disparent, pulsusque, paulo ante tremulus et intermittens, denovo æqualis et liberrimus est. Alii describuntur plures similes morbi, qui mense Novembri, 1759, in *Nosocomio Pasmanniano* aderant, quorum initium fuit horror per totum corpus, dein langor; postea dolor rheumaticus, partim vagus, partim fixus, qui omnia membra obsedit, et subinde post unam alteramve horam cessavit, tuncque pectus oppressum fuit, et ægri inceperunt tussitare. Caput etiam doluit vario modo. Quandoque post plures horas dolor rheumaticus de novo per omnia membra diffusus est; et tunc illico desit dolor capitis, pectoris oppressio, et tussis evanuerunt. Illæ autem mutationes in eodem ægro sæpius contigerunt.

"Hæc materies rheumatica, quandoque adeo mobilis et vaga, nisi bona curatione, dissipari possit de corpore, vel expelli, in unum locum confluxit aliquando, et ingentes tumores lymphaticos producit; de quibus eadem hæc paragrafo dictum fuit, quomodo in externa corporis superficie apparent, et illis pertusis, exiit semper serum flavum viscidum, quod leni calore potuit inspissari. Cum ergo patent, eandem hæc materiam ex artubus derivari posse ad caput, ad pectus, si nec inde salutari metastasi redeat ad artus, nec curatione expellatur de corpore, poterunt tales tumores in interioribus colligi, et pessima mala producere, imo mortem, uti cadaverum hoc morbo defunctorum sectio docuit.

"Tres ægri, in quibus serum, per universum corporis superficiem antea dispersum, subito interiora occupavit, rheumatismo perierunt. In binis cadaveribus reperiebatur copiosissima flava gelatinosa materia inter membrana pulmones ambientem et ipsos pulmones; totaque pulmonum substantia in admodum parvam molem compressa erat. Talis materies valde copiosa quoque inter pia mater et cerebrum atque cerebellum hæsit; anteriores cerebri ventriculi simul gelatina pleni erant. In tertio ægro disrupit tumor artuum, acuta fuit difficilis respiratio, et tussis convulsiva, que nullis remediis obediit; unde miser intra quatuordecim dies, omnibus viribus exhaustus, perit. In medio pulmonis dextri detegebatur succus, qui quinque libras æri flavi suberis reclusit. Cætera fuerant similia."—(VAN SWIETEN, *Commentaria in H. BOERHAAVE Aphorismos*, t. v., p. 654.)

more numerous instances than generally supposed.

55. *E.* The *diaphragm* and the *peritoneum* are, as far as my experience permits the remark, more frequently affected in connexion with, or consequent upon, rheumatism than the *pleura*. When rheumatic diaphragmitis is observed, either the pleural or the peritoneal surface presents the most evident indications of change, although the *crura*, or the tendinous parts of the diaphragm, may be the chief seat of disease. When this viscus is implicated, the symptoms vary not materially from those mentioned in the article on its diseases, where, also, the connection sometimes existing between rheumatism and inflammation of the diaphragm is pointed out, conformably with the results of my observations, and with my subsequent experience. (See art. DIAPHRAGM, § 9, *et seq.*)

56. Although rheumatism may affect the *diaphragm* either alone, or in conjunction with one or other of its serous surfaces, or both, as a complication, extension, or metastasis of the disease, yet the *peritoneum* may be chiefly or even solely affected; the external disease either subsiding or entirely disappearing upon the development of the peritoneal affection. Rheumatic peritonitis is probably most apt to occur either during the puerperal states, or when rheumatism affects the aponeurotic expansions and fibrous structures of the abdominal muscles and parietes; but it is of comparatively rare occurrence. (See art. PERITONEUM, § 128.)

57. *F.* Rheumatism or rheumatic inflammation may attack the *ovaria* or the *uterus* generally upon the subsidence or disappearance of the disease from more external parts. Cases of this kind are rare. An instance of metastasis of rheumatism to the *ovaria* has been adduced by me at another place. (See OVARIA, § 7, *note*.) The *testes*, either one or both, may be also similarly affected; the pain being very severe, and the swelling considerable. Three instances of well-marked metastasis of rheumatism to the *testes*, of which I have preserved notes, have come under my care.

[We are inclined to believe that rheumatic affections of the uterus are not as rare as our author supposes, having not unfrequently met with cases of this description. Indeed, what is often considered and called neuralgia of the uterus, is nothing but rheumatic inflammation transferred to this organ. There is scarcely an organ of the body which may not occasionally be the seat of the same morbid action, called rheumatic.]

58. *G.* Of the more pure complications of rheumatism, there are none so frequent as those with *catarrhal fever*, or *simple catarrh*. I shall have to show hereafter that exposures to cold and humidity are more likely to produce attacks of rheumatism when malaria, even in slight grades, is superadded to these states of atmosphere, the catarrhal affection resulting equally with the rheumatism, which may assume either of its forms, but most commonly the sub-acute, slight, and chronic, from the combination of malaria with cold and humidity. Many writers, from BOERHAAVE to STORCK, VAN SWIETEN, and others, have noticed the frequent association of rheumatism with *ague*, during some seasons, with *scurvy* in other seasons, and even with *dysentery*—complications manifestly depending

upon the combination of atmospheric conditions, upon weather, season, &c.; and more especially upon exposure to cold, in conjunction with an impure or malarious atmosphere, or with exhalations of decayed vegetable and animal matter, and often with unwholesome or improper food.

59. *H.* Rheumatism is not infrequently complicated with *disorder of the catamenia*, or of the catamenial discharge. This subject has been recently noticed by Dr. TODD, who remarks that he "has been strongly impressed with the idea that the secretions of the uterus, if of an unhealthy character, and not duly thrown off, may be absorbed into the circulation, and contaminate the blood, producing symptoms of greater or less urgency;" and he adds, that he "cannot do more than propose as a query whether, under certain circumstances, the uterus may not be regarded as a source of rheumatic or arthritic matter." (*Op. cit.*, p. 148.) I believe that in no circumstances is the uterus productive of such matter; but that it is, as I have contended in various parts of this work, a most influential agent in depurating the blood when it fully discharges its functions; and that it thus may prove, in the full exercise of these functions, the means of preventing attacks of both rheumatism and gout; while the imperfect discharge of the catamenial function, and of the depurating process thereby produced, may favour the development of either rheumatism or gout, the former especially before the forty-eighth or fiftieth year, especially in the rheumatic diathesis, or where the hereditary predisposition to either of these diseases exists. Hence interrupted, scanty, imperfect, or otherwise disordered states of the catamenia may be an efficient or a concurrent cause of rheumatism; and thus catamenial disorder may be complicated with either of the forms of this disease. Hence, moreover, arises the frequency of chronic arthritic affections in females when the catamenia become difficult, scanty, and altogether cease.

60. IV. OF THE STATES OF THE BLOOD AND EXCRETIONS IN RHEUMATISM.—I. OF THE BLOOD.—It becomes a matter of some interest to consider the states of the blood in rheumatism, seeing that the disease is considered by several recent writers, as it was by BOERHAAVE, BAYNARD, VAN SWIETEN, and many others, during the commencement and middle of the last century, to depend upon a *materies morbi* existing in the blood. I shall, therefore, give the results of observations and examinations of the blood; and when I come to consider the nature of the disease, I shall then notice in how far the changes observed in the blood are the pathological conditions constituting the malady, or are merely the results of the influence of the disordered organic nervous system on the blood—whether the alteration of the blood is the proximate cause, or is the result, of the disease.

61. BAYNARD had long since asserted that the saline and acid ingredients found in the blood and urine are present in the former in excess, owing to the non-elimination of them by the kidneys and skin; and that the excessive accumulation of them in the blood caused the rheumatic disease. It is obvious to common observation, even if not shown by NASSE, SIMON, and ANDRAL, that the blood contains more

fibrine in *acute* rheumatism than in the normal state, and that the corpuscles decrease in proportion to the excess of fibrine. The fat is also increased. In proportion to the increase of the fibrine and fat, and the decrease of the corpuscles, the whole solid residue is diminished—this state constituting what SIMON has termed *hyperinosis*, for a principal part of the science of German pathologists consists in the coining of terms. In rheumatism, especially in the febrile states of the disease, the physical conditions of the blood, rather than its chemical constitution or its microscopic appearances, are most important to the practitioner, who cannot carry a chemical laboratory, nor even a modern microscope in his pocket, and who cannot shape his treatment according to the reports furnished by these sources, however they may aid him in forming an hypothesis. In the acute states of the disease the clot is rather small, consistent, cupped, and covered by a strong buffy coat; the cupping and thickness of the buffy coat depending much on the deepness and shape of the vessel in which the blood is received, and upon the rapidity and size of the stream. NASSE states that the coagulum is firm, but that when the buffy coat is very strong the consistence of the lower part of the clot is much less. JENNINGS, according to ANCELL, maintains that the clot under the buffy coat is so loose as to fall to pieces on the slightest touch. Both are right in different cases and in different stages of the disease; at least such is the result of my observations. The serum is always clear, and of a deep yellow hue. With the frequency of blood-letting the size of the clot diminishes in proportion to the amount of serum, and the cupping and buff either continue, or even increase, however far depletion may be carried.*

* Many years ago a remarkable illustration of this fact occurred in a case, which was attended by a surgeon in Walsworth, to which Dr. W. and I were called at advanced stages of this disease. A man, aged about fifty, of a leucophlegmatic appearance and corpulent, had a severe attack of rheumatism of the lower extremities, for which he took, of his own accord, a large dose of croton oil. Violent hypochondriasis was the consequence, and the pain in the limbs suddenly ceased; but he was as suddenly seized with excruciating pain in the region of the heart, with extreme anxiety and palpitation. The surgeon instantly saw him, and bled him largely about the middle of the day. When he was seen again at night, he was found in no way relieved; the blood which was taken was very much cupped and buffed; and this appearance, in connexion with the continuance of the distress, induced the surgeon to bleed him again the night of the same day—twice largely on the day of the occurrence of metastasis. The following morning he was no better. The second quantity of blood taken was more buffed than the first. Dr. W. was sent for, and he was bled a third time largely on the second day. The coagulum was now small, but still remarkably cupped and buffed. On the third day he was no better, and constant agitation had supervened. He was bled the fourth time. I was requested to see him on the evening of that day: I saw the third and fourth quantities of blood taken away, the clots of which were very small, but remarkably cupped and buffed; the first and second quantities were described in consultation. The anxiety, action of the heart, and agitation were extreme. The lips, gums, and surface were remarkably anæmied, and he presented all the appearances I have described, as indicating extreme losses of blood. (*See art. BLOOD, § 53, et seq.*) Having heard the history of the case, and observed his existing state, I expressed my belief that he could not live twelve hours. He died within that period. The surgeon and I opened the body about twenty hours after death. Adipose matter was very abundant in the usual situations; and all the tissues presented the most remarkable pallor, very much resembling the appearance of veal. There was no fluid effused in any of the cavities, and the large vessels and cavities of

62. According to SIMON, ANDRAL, and GAVARRET, the quantity of fibrine and of fat is always much increased during the acute form of the disease, and that of hæmato-globulin much diminished; the proportion of blood corpuscles diminishing, and that of serum increasing with the quantity or frequency of depletion. The *first* part of the following table exhibits the maxima, minima, and mean of forty-three analyses of the blood of fourteen persons in this disease; the *second* part, the analyses of the blood in four peculiar cases.

	Water.	Solid residue.	Fibrin.	Blood corpuscles.	Residue of serum.
Maxima . .	839.6	228.4	10.2	130.0	104.8
Minima . .	771.6	160.4	2.8	70.1	76.9
Mean . . .	805.4	194.6	6.7	101.0	85.0
Healthy } blood }	790.0	210.0	3.0	127.0	80.0
Case 1st . .	826.8	173.2	4.8	79.0	89.4
Case 2d . .	818.3	181.7	4.6	89.1	88.0
Case 3d . .	815.4	184.6	4.0	82.6	98.0
Case 4th . .	741.1	259.9	2.6	154.3	102.0

63. The blood in the *first* of the cases (the second part of the table) was taken from a colour-mixer under the influence of lead, to which M. ANDRAL attributes the deficiency of the corpuscles. The blood was taken in the *second* from a person who had been bled six times, and had had 200 leeches applied. The *third* was the blood from a person with incipient chlorosis; and in the *fourth*, the blood was taken from a vigorous person, twenty years of age.

64. The blood of ten persons suffering *chronic* and *sub-acute articular rheumatism*, furnished, according to the analysis of ANDRAL and GAVARRET, no striking results. The proportion of fibrine in no instance exceeded 5.0, and in two cases was as low as 2.9 and 2.6. The blood corpuscles in one amounted as high as 154.3, and the solid constituents to 259.1. In the other cases the corpuscles were below the healthy average. As rheumatism loses its acute, febrile, and severely painful character, so the fibrine diminishes and the blood approaches, or altogether returns to the healthy state. As these forms of rheumatism are more frequently aggravated than relieved by blood-letting, I have very rarely had an opportunity of observing the state of the blood in connexion with them; but in two cases, the chief change from the healthy state, observed in sub-acute rheumatism of the head, was an increase of the fat in both; the serum having been of a very white or milky hue in one case.

65. ii. THE URINE, in rheumatism, requires constant observation, as upon its varying states modifications of treatment are often indicated.—A. In *acute* rheumatism the colour of the urine is generally high, sometimes of a purple-red, or thin claret. Its acid reaction is very decidedly marked; and very bulky fawn-coloured, or lateritious sediments, consisting of urate of ammonia, and occasionally of crystallized

the heart contained very little blood, which was coagulated into fibrous, stringy clots, which contained a very small proportion of red globules. The internal cavities, and the valves, and columæ carnee appeared deeply red. The pericardium was natural, but pale, and contained no fluid. The appearances generally were similar to those of an animal bled to death. (*See art. BLOOD, § 50-64.*)

uric acid, are deposited. Acetic and phosphoric acids have also been found in the urine in this form of the disease by HENRY and VAUQUELIN. In eighteen cases, in which the urine was examined by BECQUEREL, it always presented the characters usually observed in inflammation, as long as the fever continued. The deep colour and the acid reaction were always observed. The mean specific gravity was 1022.6. In cases which threw down a spontaneous sediment it was 1025.2 to 1027.0. He found that after large bleedings the urine assumed the characters of that in cases of anæmia. Albumen was detected in seven of the eighteen cases. Oxalate of lime is of frequent occurrence. The other constituents vary somewhat; but as the urine of persons in sound health varies in different individuals, and in the same person at different times, no precise inference can be drawn respecting them.

66. *B. In chronic rheumatism*, and when the pains are not very acute, the urine often retains its normal characters. Of thirty-seven cases, BECQUEREL found the urine unaffected in twenty; in seventeen it assumed the inflammatory character, and in nine of these it threw down a spontaneous sediment. If the complaint be very long continued, and much debility exist, the urine may, without being red or high-coloured, present a turbid, thick, or even fætid appearance. I have generally found the urine to have an acid reaction in the chronic as well as in the sub-acute states of the disease. In some cases, and especially when the membranes and sheath of the spinal chord are implicated, the urine has contained the phosphates; and it has never been alkaline unless much debility or vital exhaustion exists.

67. *iii. THE PERSPIRATION* has not received due attention in the different forms of the disease, as respects either its chemical constitution or its quantity and sensible characters. When the perspiration is profuse in *acute* rheumatism, minute vesicles, or sudamina, are often observed on different parts of the surface, especially the breast or trunk. The perspiration has generally an acid or peculiar offensive odour, which is less remarkable, or becomes so, when any internal complication or metastasis supervenes. Lactic acid, the ordinary free acid in sweat, is usually increased; and SIMON states that, when there is an acid odour, acetic acid is present. Persons subject to *chronic* rheumatism have these pains removed by a free or copious perspiration; and those thus subject, who do not take sufficient exercise, are generally liable to have a return of the complaint, if a sufficiently perspirable state of the skin be not preserved, the cessation or sudden suppression of this discharge often sufficing to reproduce the disorder, without any exposure or other exciting cause.

68. *V. DIAGNOSIS.*—Rheumatism may be confounded with gout, with scurvy, and, in the form of lumbago, with nephritic affections, or with inflammation of the membranes or substance of the spinal chord. Various affections of the joints, of the periosteum, and of the nerves, especially neuralgic affections, may also be mistaken for rheumatism.—*A. Rheumatism is often not easily distinguished from Gout.**

* "In rheumatismo discernendo a podagra chiragrave, sæpius falluntur medici. Sunt tamen, quæ distinguunt.

In general, however, the large joints are first attacked by rheumatism, and the small joints by gout, the former disease appearing, after chills or rigours, in the acute form, and at an earlier age than the latter; and, unless at a very early period of life, gout is more disposed to affect internal organs than rheumatism, and it is generally preceded by, and sometimes associated with, more marked disorder of the stomach, liver, and kidneys. It should not, however, be overlooked, that both diseases are so nearly allied, especially in certain of their forms, as not to admit of diagnosis, the arthritic form of rheumatism, especially when affecting the small joints, and occasioning nodosities (§ 25), nearly resembling chronic gout, and justifying the popular appellation of "*rheumatic gout*."

69. *B. From simple or serofulous inflammations of the joints* rheumatism is often distinguished with difficulty. Rheumatic inflammation of the joints may, however, affect serofulous persons, or inflammation of these parts may attack either the rheumatic or the serofulous diathesis; and, although closely allied to rheumatism, as affects the former diathesis, it cannot be viewed as an instance of rheumatism of the part. In acute or sub-acute rheumatism not one joint only is commonly affected, but several, and the affection moves from one to another, and along the aponeurotic expansions; or if it be permanent in one, or intra-capsular, the distention gives the joint the appearance noticed above (§ 28, *et seq.*). When inflammation and its consequences supervene upon the rheumatic affection, then the local disease presents the changes usually consecutive of simple inflammation of the joint, while the constitutional disturbance still preserves many of the rheumatic characters, and both one and the other often are influenced by atmospheric states and changes.

70. *C. Rheumatism may approach the characters of neuralgia*, or be associated with it. It may even affect, as stated above (§ 35), the fibrous sheath of a nervous trunk, as in *sciatica*, or the *ischias nervosa* of COTUNNIUS. When

Medicus igitur primum omnium, utrum ægri corpus arthritidis proclivius sit, necne, animo diligenter perpendat. Deinde quæ indicia ante apparuerint, præsertim an ventriculus affectus sit, quod quidem in rheumatismo simpliciter perquam rarò fit: perturbatio autem ventriculi sive *dyspepsia*, arthritidis accessionem biduum triduamve antevenerit. Qualis febris et rheumatismus et arthritidem comitatur, talis postea animadvertenda est. Ille enim a frigore incipit, nec remissionem habet; hujus verò febris status temporibus remittit, et interdum omnia febris symptomata ex toto cessant. Tum ex ratione, quæ dolor accedit, et ubi residet facile diagnositur: Rheumatismus plerumque tardè advenit, et statim ab initio articulos majores occupat: si quando minores occupet, nunquam nisi in longinquioribus morbi exemplis heri videmus. Contrà ea tamen Arthritidis multò frequentius minores, quam majores torquet; qui quidem articuli cò magis rubescunt et tumescunt. Podagra denique ætate præcocius, juniores verò rheumatismus, victimas excruciat.

"A doloribus scorbuticorum facile discriminatur. Scorbuticorum arteriæ non nisi permodicè inequaliterque micant; interdum et subsiliunt. Scorbutus etiam specie interdum livida, quam urina præ se fert; specie et putrescenti, quæ per totum corpus hic illic conspiciuntur, sese haud raro præbuit.

"A nephritide satis distinguunt 'dolor in regione renis, sæpe urteritis iter sequens, vomitus, cruris stupor, testicul ejusdem lateris retractio aut dolor,' et dolor renum ex statu pronè nunquam adaugendus.

"Non est, cur hæc in re, dolores, qui debilitatem e lue venerea enatam consequuntur, nos in rheumatismo distinguendo fallant. Prior *syphilis*, et rerum inde ortarum cognitio, satis discriminat."—(*J. Copland, Op. cit.*, p. 20.)

rheumatism is complicated with that form of neuralgia which depends upon an affection of the sheath of the nerve, they may be both viewed as almost the same complaint, and differing only as implicating different seats or parts; and they generally both arise from the same cause. True neuralgia, or *tic-douloureux*, however, depends more upon some change affecting the origin or roots of the nerve than upon any alteration implicating its trunk or branches, and occurs in very violent paroxysms, between which there is a complete immunity from pain; whereas, when the sheath of a nerve is attacked, there is more continued affection, more of the symptoms of neuritis, and often numbness of parts below the seat of pain, with a sense of burning heat in the part affected.

71. *D.* Although the pains experienced by persons suffering from secondary symptoms of *sypilis* have been ascribed by some to that malady, and by others to the mercury used for its cure, yet there is reason to believe that these, or either of them, may be only a chief cause, cold and other causes concurring with them to produce the distressing pains experienced during the night, generally in the periosteum of the more exposed bones. These pains, instead of affecting the joints or extremities of the bones, as in rheumatism, are seated chiefly in the superficies of the bodies or shafts of the bones, and depend on a specific form of inflammation of the periosteum with thickening and nodes. The history of the case, the previous treatment, the seat of pain, the elevation and irregularity of the part affected, the absence of fever, and the great severity of the pain during the night, generally indicate the nature of the complaint, especially when the flat surface of the tibia, or the outside of the ulna, or of the radius, or the sternum, or the frontal or parietal bones, are affected; or when eruptions, sore throat, &c., accompany the disease; or when large quantities of mercury have been prescribed.

72. VI. PROGNOSIS.—SYDENHAM places the prognosis of rheumatism in a too favourable point of view when he says that it is rarely fatal; and VAN SWIETEN very justly remarks, that this is only the case when it is fixed in the joints; for, when acute rheumatism changes its place, it is apt to seize upon some internal viscus, and place the patient in the most imminent danger. The justness of this remark will be readily acknowledged at the present day, when the frequency of complicated and metastatic rheumatism is considered, and the influence of age, and of various states of predisposition, in favouring the complications and metastasis of the disease is recollected. The risk of cardiac complication is especially great; indeed, the existence of it may be inferred in the great majority of cases under the age of puberty; and both this and other complications and metastases, already noticed (§ 47, *et seq.*), may occur at all ages. VAN SWIETEN observes that, when an internal affection commences after the subsidence of external rheumatism, and terminates fatally at a more or less remote period, the result is too often considered as due to the internal disease, and not to the rheumatism, which is actually the cause. While, therefore, acute rheumatism is attended by fever, if it occur very early in life; if the pulse be very rapid, open,

and compressible; if the patient have experienced a depletory or lowering treatment, and is the subject of mental anxiety; or if the pain continue to change its place, there still exists more or less contingent risk, even although the sounds and impulse of the heart be found natural upon a careful examination, and the functions of the brain be undisturbed; if internal complication is detected, or metastasis occurs, then the patient should be considered in a state of great danger, although recovery may take place in such circumstances, or the changes which have already supervened may only remotely tend to shorten life.

73. Even the *sub-acute* and *chronic* forms of the disease may be followed by prolonged suffering, or, if seated in the joints, may be followed by irremediable or partially remediable changes, as ankylosis, if neglected or improperly treated; and still more frequently by relapses, or by more or less suffering for months, or even years. In all cases of acute, sub-acute, or chronic rheumatism, an immunity from the disease, or from a relapse or return of it, should not be relied upon until the tongue becomes clean, the biliary and intestinal secretions are natural, the alvine and urinary excretions are healthy, and until the perspiration is free and equal.

74. VII. REMOTE CAUSES.—i. *Predisposing Causes.*—A. *Temperament and diathesis* have some share in producing a state of predisposition to one or other of the forms of rheumatism. The disease may affect any constitution or temperament, but the bilious, melancholic, and bilio-irritable temperaments are apparently most liable to it. That there is a rheumatic diathesis—a *diathesis rheumatica*—has been asserted by most medical writers; this diathesis being hereditary. I have certainly observed numerous instances which seemed to support this opinion; but I shall give it a more particular attention in the sequel.

75. *B.* The most remarkable source of predisposition exists in the several *digestive, depurating, or eliminating organs*, especially the *stomach* and the *skin, kidneys and liver*, and even, also, the *intestinal canal*. In very few cases are the functions of the *stomach, duodenum, and liver* duly discharged, either for some time previously to or during the attack. The stomach is weak, or the food unwholesome and insufficient; and the liver is torpid in function, or retentions of the secretion in the ducts and gall-bladder have taken place, until primary and secondary assimilation has been impeded or disordered, and excrementitious materials have accumulated in the blood. While this state of the hepatic functions, especially when accompanied with biliary congestion or accumulation, occasions merely wandering or fixed symptomatic pains in some persons, it is often followed by attacks of either gout or of rheumatism, both in them and in others, when the predisposition to either is more fully developed, and the respective exciting causes come into operation. The functions of the other depurating organs, especially of the *kidneys, skin, and digestive mucous surface*, and even of the *uterus*, when imperfectly discharged, are also more or less concerned in predisposing to some form or other of this complaint, and even also in determining the particular states or complications in which it is often observed.

76. *C. Sex* has manifestly but little influence

in predisposing to rheumatism; for so much depends upon exposure to the exciting causes, that those classes, whether males or females, which are thus most exposed will present numerically the greatest predisposition. HOFFMANN is certainly not correct in considering females more predisposed than males. Rheumatism is, perhaps, more frequent in the former, in a chronic form, after the age of fifty; but before that age it is certainly more frequent in males. VAN SWIETEN justly remarks that men, being more exposed by occupation, by irregularities, and by dissipation, and their numerous concomitants, are more liable than females to rheumatic affections. HAYGARTH states, that he found the disease more frequent in males than in females, in the proportion of 98 of the former to 73 of the latter.

77. *D. Age* has also no very marked influence after 15, or after puberty, if the proportion of persons living at certain ages be taken into the account. The greatest number of cases is met with between the ages of 15 and 30; but the proportion of those living at that age is greater than at a more advanced age. M. CHOMEL found that, in seventy-three cases, thirty-five were first attacked between the ages of 15 and 30; twenty between 30 and 45; seven between 45 and 60; and seven after 60. Two only were attacked before 15, one at 8, and the other at 9 years. I have seen several cases between the ages of 5 and 15; but hardly one at that early age that was not complicated with either endocarditis or pericarditis, or with both, and even also with inflammation of the membranes of the spinal cord.

78. *E. Depressed, impaired, or exhausted organic nervous energy* is most influential in predisposing the frame to the invasion of every form of rheumatism; and by whatever causes this energy may be weakened or exhausted, by none is this effect more manifestly induced than by premature or excessive venereal indulgences, and masturbation or self-pollution. By these, more, perhaps, than by other causes, is organic nervous power depressed, and the tone or healthy condition of the fibrous tissues subverted, thereby occasioning imperfect assimilation and excretion, and favouring the morbid influence and operation of causes which alter organic sensibility, and vital tone and contractility.*

79. ii. *Exciting Causes*.—A. Of these, cold has been viewed as the most influential, in whatever way it may be directed on the frame. In many cases, however, it is not the mere abstraction of the animal caloric from the whole or part of the frame, but the combinations of this with other influences or agents.—(a) Of these combinations the most common depend upon the modes of *warming and ventilating houses and chambers* in this country. Although

these modes, viz., by open fire-places and coal fires, admit of a free and healthy ventilation, provided that the air thus supplied be pure, still the body is unequally heated by them; and while the parts opposite the fire are inordinately excited by the radiated heat, the other parts are exposed to, and depressed by, the currents of cold air proceeding from the doors and windows to the fire-place.* To this cause, more especially, may be imputed the prevalence of the several forms of rheumatism in this country. Still more injurious are insufficient clothing, especially if it be connected with unwholesome or insufficient aliment; exposure to cold conjoined with humidity, and to currents of cold and moist air; riding in open carriages, especially at night and without sufficient protection, and more particularly if the cold and humid air contain malaria, or exhalations from decayed vegetable matter; and living in tents, or lying and, still worse, sleeping on the ground, or on cold, damp, or wet places. This last cause is more especially injurious, inasmuch as it abstracts the animal heat, changes the natural electrical states of the body, and exposes the frame more completely to terrestrial exhalations at a time when it is most predisposed to be affected by them. In addition to these, wet clothes, the sudden suppression of perspiration, the living in cellars or on the ground-floor, or where the exhalations from the soil or sources of vital depression are given out constantly, and even solicited by fires and ventilation.

80. The causes now enumerated, both predisposing and exciting, are such as depress the organic nervous energy, and weaken the functions of those organs which are actuated by the organic nervous system—the digestive, the assimilative, the secreting, and the excreting functions—thereby changing the condition of the blood, as well as more directly affecting the circulating fluids through the heart and vessels themselves, and giving rise to morbid states of the secretions and excretions, more especially of the cutaneous and urinary excretions.

[Rheumatism is a disease which, from its frequent occurrence in the United States, its painful and protracted course, and the many evils that follow in its train, has especial claims upon the attention of the American practitioner. The following table, for which we are indebted to the able work of Dr. TORRY, on the "Climate of the United States" (p. 273), exhibits the annual and quarterly ratios of rheumatic cases treated per 1000 of mean strength, on an average of ten years, among the United States soldiers, in each system of climate:]

* "Inter causas ejusemodi, quæ patria in nostra rheumatismum longum excitare soleant, numerari debet ratio domiciliorum calefacientiorum, quæ conclavia et cubilia nostra calore radiante temperant. Nam ad eam inæqualiter facit igitur, ut una ex parte corpus calefiat, ex altera frigeat. Huc forsitan adnumeranda sunt crebræ vestium mutationes, vel potius ratio vestes induendi frequenter mutata. Rheumatismum longum et excitant cœli tempesties, tempestatumque anni assidua mutabilitas. Ubi vel hiems vel æstas incipiat, et ubi desinenda sit, certissimè distinguere prorsus nequimus. Hiemem in media æstate et æstus interdum haud mediocrem frigiditatem in mediis non raro vidimus: quin immo intra diem unicum temperatura aëris xxx gradus sæpe percurrit. Cœlum nostrum humidum est, quippe qui insulam incolamus, cui Zephyrus et Caurus, e regione calidæ exoritur, perque oceanum magnam percurantes, madidis incubat alis; et sudorem, qui corpus leniter perfundat, subito reprimat: ideoque morbum sopitum resuscitat, aut in iis, qui antea vacabant, progignit."

* "Inter hodiernos et nostrates potissimum ad luxuriam et incontinentiam nimiam referendus est, et ad artes operæ sedentariæ egentes, quæ corpus intra parietes retentum et occupatum infirmant. Eos certè, qui sedentarii victum quærant, quique sub dio ferè nunquam morantur nec ibi ad sudores mediocres excreverint, citò infirmari; nimium admodum sentire, quique irritantur justò procliviores esse; idcirco e causis extra afficientibus facilis in valetudinem incidere, ex omnium experientiâ satis constat. Nec igitur latet, quomobrem nautas rheumatismo vacare, etiam si præter ceteros homines, crebriores cœli mutationes, et causas omnes excitantes, subeunt. Ex hoc quoque liquet feminas quàm mares, inbecillos quàm robustos, et antea affectos quàm immunes, sibi sæpius mancipare."

RATIO OF RHEUMATIC DISEASES.

Systems of Climate.	Ratio treated per 1000 of Mean Strength.				
	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Annual Results.
NORTHERN DIVISION.					
First Class. Coasts of New England	24	28	29	30	110
Second Class. Posts on northern chains of lakes	41	37	36	38	151
Third Class. Posts remote from the ocean and inland seas	45	48	37	34	166
MIDDLE DIVISION.					
First Class. Coast from Delaware Bay to Savannah . .	37	36	27	24	126
Second Class. Southwestern stations	36	31	20	27	112
SOUTHERN DIVISION.					
First Class. Posts on Lower Mississippi	28	16	22	23	90
Second Class. Posts in the peninsula of East Florida . .	38	23	90	26	119
Average	36	31	29	29	125

From these results Dr. TORRY concludes that those affections which are generally ascribed to sudden variations of temperature, conjoined with excess of moisture, are less under the influence of atmospheric agency, as exciting causes, than is usually supposed, but that they are in some measure controlled by the same laws which govern pulmonary diseases. He very justly remarks, that if cold, moisture, and sudden alternations of temperature were the chief causes, the highest ratio should be given on the New England coast, and the northern chain of lakes; but that, on the contrary, it is found that, like pulmonic diseases, rheumatism is most rife on the dry and cold atmosphere of the interior (the Third Class of the Northern Division), characterized by the extreme range of the thermometer, and by seasons strongly contrasted. Among 6257 cases registered, only one death is reported. Were these affections, as Dr. TORRY observes, very much under the influence of meteorological causes, we should find, as in pulmonic lesions, a great contrast in the ratios of the seasons. Taking the mean of the four seasons, as shown above, the first and second quarters give the highest averages; but, contrary to the law which governs pulmonary diseases, the ratios of the third and fourth are the same. Viewing the whole subject, however, it is found that a similarity obtains in the general laws which, on the one hand, govern rheumatic, and, on the other hand, pulmonary, but especially catarrhal diseases.

The same results are arrived at by the recent reports upon the medical statistics of the British troops, as will appear from an inspection of the table at the head of the next column.

These results show that rheumatic diseases are more prevalent in the Mediterranean than in Canada and Nova Scotia, and that, as the British Reporter observes, "though some of the pro-

Admissions from Rheumatic Affections annually per 1000 of Mean Strength.	Jamaica.	Nova Scotia and New Brunswick.	Bermudas.	Malta.	Ionian Islands.	Gibraltar.	Canada.	Mauritius.	Windward and Leeward Command, West Indies.	United Kingdom.	Cape of Good Hope.
	29	30	33	34	34	38	40	46	49	50	57

inces of the Cape of Good Hope have occasionally been without rain for several years, these diseases are more frequent in the dry climate of that command than in the West Indies, where the condition of the atmosphere is as remarkably the reverse; yet have extreme cold and atmospheric vicissitudes, coupled with excess of moisture, been assigned as satisfactory causes for their prevalence." Dr. TORRY notices the fact, that between the ratio of Canada and that of Nova Scotia and New Brunswick, the former being one third higher than the latter, the same law obtains as in the United States; for while "in Canada the cold becomes so intense that the mercury, congealed in the thermometer, serves no longer to indicate the extreme reduction of the temperature, in Nova Scotia, on the contrary, the mercury is seldom lower than 6° or 8° below zero in winter, or above 88° in summer. Notwithstanding the atmosphere, in consequence of the same causes which modify its temperature, viz., its insular character and inter-secution by lakes and bays, is exceedingly moist, and fogs are, along the coast, common throughout the year—a circumstance regarded as most favourable for the production of rheumatism—yet it is seen that the ratio is lower than in the dry and intensely cold climate of Canada." Dr. TORRY explains this fact, on the ground of the predisposition induced by the extremes of the opposite seasons, and maintains that rheumatic affections, like those of the lungs, obey in some measure the inflections of the isothermal and isoclineal curves. He also observes, that the term rheumatism is generally so loosely applied that a host of ailments, with no character in common save that of pain, are classed under it; and hence that, were this investigation confined to cases of the acute form, the result would be modified. "Of the fact," he adds, "that the application of cold, more especially when combined with moisture, to the body, when unusually heated, is the chief exciting cause of acute rheumatism, there can be little doubt; but when we reflect that, for every instance of rheumatism so induced, numbers continually endure a much greater exposure to the alleged causes with impunity, it follows that still more depends on the predisposition, how this predisposition is said to be given by many circumstances, as age, temperament, climate, and even hereditary liability. As regards the influence of climate, it would appear that acute rheumatic affections, like those of the lungs, are less dependent on mere variations of temperature than upon its extreme range as connected with the seasons, the former being an exciting, and the latter a predisposing cause."

81. VIII. THE NATURE OF RHEUMATISM has been much discussed during the last and present centuries. It was formerly imputed, by BAYNARD, BOERHAAVE, VAN SWIETEN, and others, to a *materies morbi* existing in the circulation, which affected particular parts in a promi-

nent and painful manner, according to their predisposition or morbid tendency. More recently, it was viewed by SROLL and LATHAM as an inflammation of a peculiar form, or affecting a particular series of vessels, namely, those only admitting the colourless parts of the blood, although the existence of such vessels had not been demonstrated. CULLEN, C. SMITH, and BICHAT considered acute rheumatism as an inflammatory state of the muscular fibres, which assumed a peculiar form, owing to the cause and the nature of the structure affected. BICHAT, however, considered that this affection implicated more particularly the fibrous tissues of the joints and the aponeurotic expansions. These latter opinions were generally received, when I ventured to suggest the view taken in the subjoined passage.* Since then, Sir C. SCUDAMORE, HILDENBRAND, and TODD have advanced different views as to the pathology of this disease. The first of these writers has regarded rheumatism as pain of a peculiar character, with or without inflammatory action, affecting several tissues at the same time, but chiefly the white fibrous tissues of the joints and muscles. "In acute rheumatism, he conceives the morbid action to be seated in the ligaments, the tendons, the aponeurotic membranes, and the bursæ, but in the ligaments most frequently. In the sub-acute form, though any of these textures, and even the nerves, may be affected, the disease is most frequently confined to the bursal, that is, the synovial texture surrounding the tendons. In the chronic form, though the disease may occur in the ligaments and tendinous tissues, he represents it as most common in the sheaths of the tendons and the aponeurotic membranes."

82. HILDENBRAND is more elaborate in his consideration of this subject than any recent writer. He views it as a specific form of inflammation, affecting fibrous, or serous, or fibro-serous membranes, and differing from other

specific inflammations proceeding from atmospheric conditions and changes, from catarrhal inflammations which affect mucous surfaces, from erysipelatous inflammations which attack the skin, and from phlegmonous inflammations which appear in any structure. Pain he considers to be the chief characteristic, or eminent παθος of the complaint, the other characters of inflammation either being absent or contingently present. He considers that the imponderable agents, light, heat, and electricity, are chiefly concerned in the causation of the disease; states of the air, alterations of the temperature, and conditions of the surface of the body, &c., subverting the equilibrium of the circulation, and occasioning efforts to recover the harmony subsisting between the different systems. These efforts he believes to be concerned in, or to constitute, the more immediate cause of rheumatism. I cannot refer to the numerous arguments by which he supports his views, but many of them are fallacious, and are founded on postulata. (See *Institut. Medico-Practicæ*, t. iii., p. 360, *et seq.*)

83. Dr. TODD, one of the most recent writers, has adopted a similar theory to that contended for by early writers in the last century. He observes that, on reviewing the leading phenomena of the rheumatic paroxysm, it is impossible not to perceive a resemblance of the most marked kind to some of those diseases which are confessedly due to the introduction of a morbid material into the blood; and that, as in those diseases, the fever is not relieved "until the morbid element which gives rise to it has, as it were, spent its fury on the textures to which it is attracted." He next inquires into the nature of the morbid matter, which he considers "to be the cause of the rheumatic diathesis, as well as of rheumatic fever;" and he proceeds to observe that "the two most remarkable excretions in the rheumatic diathesis, or fever, are the urine and the sweat. Both these are distinguished by the presence of an unusual quantity of free acid. The urine contains a large proportion of lithic acid; and those highly coloured deposits take place in it, which Dr. PROUT supposes to arise from the formation of purpures. The lithic acid diathesis, however, is by no means so strongly marked in the rheumatic as in the gouty state, and these excessive deposits of lithates are more to be regarded as belonging to the paroxysms than as constant concomitants of the diathesis. The high colour of these deposits is more marked in rheumatism than in gout. The sweat of rheumatism is much more copious than that of gout, and is evidently much more acid. In the latter disease, indeed, sweating is generally absent. Lithate of soda is never found in the rheumatic paroxysm, nor in the diathesis; and those derangements in the biliary system, which so often occur in gout, are not so apparent in rheumatism. If, with these considerations, we take into account the most frequent causes of the rheumatic diathesis and paroxysm, we shall obtain a farther clew to the determination of the problem we have proposed. These causes must be admitted to be imperfect assimilation and vicissitudes of temperature; and hence the ill-clad and badly-fed children of the poor are the most numerous victims of rheumatism. Hard work, exposure to cold and wet, bad food, are

* "Quidam e scriptoribus antiquioribus de rheumatismo discentes, quales hypotheses explicari sumus, tales fingebant: fluidiorum scilicet lentorem esse, qui partis affectæ vascula obstruat; quidam verò, materiam morbidam in corpore generatam, et ibi per totum corpus circulentem, donec maturuerit, ut medicatricibus naturæ viribus, per vascula emunctoria expellatur; et hujusce materiæ morbide expulsionem perquam necessariam ad *κρίσις* vel sanationem proferendam conducere. Hunc morbum in vasculis articuli dolentis *lymphaticis* sedem habuisse, apud quosdam hodiernos hypothesis tenet. Frigus tamen cui corpus, corporisve pars obijcit, vasculorum subter cutem dispositurum contentionem, h. e. spasmus efficere, indeque partium interiorum et articulorum et fibrarum musculorum et aponeuroseon tendinosarum inflammationem necessariò oriri, opinio jam propè universa est. Hæ hypotheses jam memoratæ, eorum quæ in rheumatismo occurrant partem tantum explicant, itaque simul ac editæ sunt, obsolescunt.

"Ab his tamen, qui nihil nisi musculorum fibrarum et aponeuroseon tendinosarum statum inflammationem esse rheumatismum affirmant, quæri possit: Quare inflammationem gangræna aut suppuratio consequi nunquam reperitur? quæ res quidem in reliqui corporis affectionibus, quæ ex inflammatione oriuntur, sæpius accidit. Et quæri potest: Cur dolor hujusce morbi a cæterarum inflammationum cruciatibus tantum differat?

"Nihil quidem, nostro judicio, obstat quo minus rheumatismum affectionem nervorum, præcipue ad partem affectam pertinentium, singulare, hisque inseparabilem; et ex nihilo alio nisi adactione corporis, ut excitetur proclivitate (vel ut vulgò dicimus ex irritabilitate, vel sensibilitate adactâ), nasci existimemus. Quare inflammationem, non rheumatismi causam; sed hujusce affectionis singularis nervorum, sive systematis vel ad partem affectam pertinentium, effectum esse arbitremur."—(*Op. sup. cit.*, p. 17.)

strongly contrasted as causes of the rheumatic diathesis, with the ease, comfort, and excess which give rise to the analogous one of gout. If now we remember that the skin is the great emunctory of lactic acid, and that bad food, or too little food, may give rise to its undue development, as well as too much food, it is no wonder that, as lactic acid is imperfectly excreted through its natural channel, in consequence of the influence of cold in checking perspirations, and is too freely developed in the alimentary canal, it should accumulate in the blood and become eliminated at every point. Moreover, the long continuance of the causes which produce the defective cutaneous secretion, and the deranged gastric one, will give rise to the undue development of the lactic acid, in the secondary destructive assimilating processes; thus infecting the blood from every source, and tending to perpetuate the diathesis." (P. 142-4.)

84. There is much that is manifestly true in the above view taken of this disease; but the changes described are merely a part of the successive morbid conditions consequent upon the remote causes. They are, however, important changes, and have been always insisted upon by me in my lectures, and have furnished the basis for one of my chief indications of cure for many years, as shown in a work published some time ago, in which the author states this doctrine and the treatment founded on it. He there remarks that, "in this species of fever the perspiration, urine, and saliva will be found invariably acid, and the use of alkalies beneficial;" and he adds, that "this employment of alkalies, and the observation upon which it is founded, I derived a long time since from Dr. J. COPLAND."—(*The Simple Treatment of Disease*, by J. M. GULLY, 8vo; Lond., 1842, p. 133.) But, as I shall have to state hereafter, these are not the only changes which either constitute or prove a *materies morbi* existing in the blood, and directly causing or perpetuating rheumatism; there are other alterations which are both antecedent to, and concomitants of, these changes, and some of which are the causes of those which are more prominently manifested in the blood and in the excretions. There is every reason to infer, from the nature of the predisposing and exciting causes, and from the more immediately resulting phenomena, that the earliest changes which take place in the economy are depression of the organic nervous or vital energy, imperfect assimilation and impaired excretion; and that the resulting retention of effete and excrementitious materials (*see art. DISEASE*, § 99-102, *et pluribus*) is followed by morbid excretions, chiefly from the kidneys and skin. But, perhaps, the most important of the consecutive changes—consecutive especially of the morbid condition of the organic nervous system—is the increase of the fibrine of the blood and diminution of the red globules; states which, under the influence of this system, are manifestly concerned in producing the complications and metastases which so frequently occur in acute rheumatism, and especially in those cases in which these changes in the blood are the most remarkable. After the most attentive consideration I have been able to devote to the subject, I believe that the *pathology of rheumatism* may be stated as follows:

85. *a.* The remote causes or occasions of rheu-

matism are principally of that kind which either directly or indirectly depress the organic nervous or vital energy of a part or of the whole body, altering the sensibility and other vital conditions and functions thus partially or more generally; and these causes, whether intrinsic or extrinsic, as respects the economy, affect, through the medium of the organic nervous system, the vascular system, and the blood, and ultimately the secretions and excretions.

86. *b.* These causes, especially such as impair the power of the constitution to generate animal heat, or rapidly transfer this heat from the surface, and are connected with changes in the electrical conditions of the body in relation to those of the atmosphere—more particularly insufficient nourishment and clothing; low, humid, and cold localities; living in cellars, or upon or near the surface of cold, damp, or clayey soils; the proximity of marshes and other sources of malaria; seasons in which the quantity of rain has been excessive, and east or northeast winds prevalent, &c.—are such as produce the most remarkable effects upon the organic, nervous, and vascular systems, thereby developing, according to peculiarity of constitution and concurrence of causes, the several forms of rheumatism and their characteristic phenomena.

87. *c.* Owing to the greater prevalence of these causes in some districts, or countries, than in others, rheumatism is so prevalent in these as to be *endemic* as respects them; and owing to unusually wet seasons, and the prevalence of east or northeast winds, or to remarkable vicissitudes of weather and temperature, this disease has been not merely prevalent in a single district, but also so very generally diffused as to have been *epidemic*, endemic and epidemic prevalences of the complaint having been generally overlooked by writers, and hence not referred to their respective causes.

88. *d.* The nature and operation of the remote causes—the effects produced by them on the organic, nervous, and vascular systems, and consecutively upon the blood, the secretions, and excretions, and the nature of these effects, especially in acute and sub-acute forms of the disease, serve to explain the frequency of the complications and metastases of these forms; the constitution of the blood manifestly favouring the supervention of disease of internal serous or fibro-serous surfaces, and the effusion of fibrinous lymph on the affected surface.

89. *e.* There is no satisfactory proof of the lactic or acetic acids, found in the perspiration during acute rheumatism, or of the uric acid found in the urine, having existed in the blood previously to their excretion from it, and there forming a *materies morbi*. It is, on the contrary, more reasonable to infer that the elements of these acids accumulate in the blood, owing to the operation of the predisposing and exciting causes upon the organic, nervous, and vascular systems, and upon the organs which these systems actuate; and that the accumulation or condition of these elements gives rise to these acids in the excretions as well as to the other changes in them and in the economy; and that these acids are probably the effect, rather than the cause, of the disease. The excess of fibrine, and diminution of red globules, in the blood, are most probably owing to the same mode of oper-

ation of the remote causes. Even granting that these acids are in part formed in the digestive canal, and in the blood during the disease, it is not unlikely that they are also partly formed by the excreting organs, especially when their large amount in some cases is considered.

90. *f.* The great importance of the primary effects produced in the organic nervous and vascular systems, and of the consecutive changes in the blood and excretions, should direct a more intimate reference to these effects, when devising the indications and means of cure, than has hitherto been attempted. These effects, primary and consecutive, are such as require the organic nervous energy to be duly supported and developed, the exuberance of fibrine to be diminished, the tendency to the exudation of fibrinous lymph on serous surfaces to be counteracted, and the morbid conditions of the secretions and excretions to be removed by means appropriate to the respective conditions.

91. *g.* The frequency of complications and metastases of rheumatism is owing, 1st. To pre-existing tendency, lesion, or disorder of some organ or part; 2d. To exposure to some energetic cause during the rheumatic disease, as violent mental emotions, causing affections of the heart or brain; 3d. To depletory, depressing, or exhausting means of cure, thereby lowering the vital resistance, and favouring the extension or metastasis of disease from the periphery to the centre of the frame; 4th. To the neglect of the morbid states of the blood, especially of the exuberance of fibrine; 5th. To the neglect of the physical and chemical states of the secretions and excretions, and of the means which these states should suggest; 6th. To measures which act locally, and which, by suppressing the local manifestation of a general or constitutional disease, tend to the production of it in other parts, or in internal organs.

92. *h.* Rheumatism is attended by phenomena, which, however nearly allied to gout in many cases, are different as respects, 1st. The seat and character of the pain; 2d. The state of the blood, particularly in regard of the abundance of fibrine, and the diminution of red globules in the former disease; 3d. The nature of the excreted acids and salts, and the state of the excretions from the skin and kidneys (§ 65–67); 4th. The seat and nature of the consecutive local changes, which in arthritic rheumatism are chiefly within the capsules and at the ends of the bones, but which in gout are external to the capsules, and are often attended, in chronic cases, by the peculiar gouty concretions; 5th. The remote causes, predisposing and exciting; those of rheumatism chiefly causing a deficiency of red globules and poorness of blood; those of gout, an exuberance of globules and richness of blood.

93. *i.* The pain in rheumatism, whether affecting the fibrous tissues of joints, or of tendons and aponeurotic expansions, does not proceed from inflammation of these parts or of the muscular fibre; and the increased pain on motion, or the inability of motion, is not dependent on affection of the muscles themselves, but are chiefly owing to the change in the functions and sensibility of the ganglial or organic nerves supplying these structures. When inflammation supervenes, it is owing to the influence of these nerves upon the capillary

circulation of these tissues, and to the irritation of the morbid fluid exuded from them, either internally or externally, to the capsules.

94. *k.* That the disease actually originates, and continues mainly seated, in this part of the nervous system, is shown, 1st. By the nature and operation of the remote causes; 2d. By the transition of the morbid sensibility from one part of the periphery of this system to another—from one side or joint to that on the other—from a superior to an inferior extremity, &c.; and, in cases of exhaustion, from the periphery to more central parts, and not in the course of the cerebro-spinal nerves. The changes in the vascular system, in the blood, and in the secretions and excretions, are the consequences of the morbid condition and excited sensibility of the ganglial nervous system. Inflammatory irritation or action, when it supervenes, either internally or externally, is owing to this cause, or to the irritating nature of the fluid effused from the affected tissues, or to a combination of these causes; and the augmented pain, on motion, of an affected joint or limb, is also owing to the exalted sensibility and tenderness of the affected fibrous or fibro-serous tissues, manifested more especially when these tissues are stretched or brought to a state of increased tension.

95. *l.* The treatment of the several forms of rheumatism, especially the acute and sub-acute, has been conducted by me since the subject first engaged my mind in 1814, upon the pathological basis now stated, and always with a successful issue, and without internal complications and metastases, if they were not present previously to the employment of the means which this view suggested.

96. IX. TREATMENT.—The *indications* and *means of cure* advised for the several forms of rheumatism have been as different, or even opposite, as the views which have been entertained of the causes and nature of the malady; and even at the present time very opposite doctrines respecting the pathology and treatment of the disease are promulgated by able authorities, each one appealing to facts—too often false facts—as demonstrative of success, without giving due consideration to the influence of vital resistance or constitutional power—the *vis medicatrix nature*—in withstanding injurious influences and agents, and to the manifest disposition of the economy to return to a normal condition, where injurious causes no longer continue to operate, and where no organic injury calculated to impede or interrupt the vital functions has been produced.*

* Apud antiquiores de rheumatismi curatione nihil certi reperiuntur: quippe qui morbum, sicut supra memoravi, penè ignorare, et cum arthritide confundere, viderentur. Verutamen, ut e scriptis Græcorum patet, sanguinem mittere, movere alvum, et tepidâ perfundere solebant. Romani de rheumatismo curando nihil meminerunt; neque dubium, quin podagrâ chiragravè speciem duxerint.

“E GALENI temporibus usque ad seculum decimum sextum, de hoc morbo, deque curatione ejus, nihil prorsus reperiuntur; nec apud Arabes quidem, ubi, Europâ ignorantique barbarique nebulis obumbratâ, omnes Esculapii filii discipulique concesserant. Sub finem seculi decimi sexti, rheumatismum ab arthritide et catarrho, quibuscum tam sæpè confusus esset, discriminavit BAL-LONUS, eique iterum rheumatismi nomen, forsân parum feliciter, indidit. SYDENHAMUS hunc morbum ex artis medicæ regulis submovere, et sub morbi accessionem ante omnia sanguinis missioni fisis videtur. Ferè nullus alius morbus est, cujus in curatione plura medicamentis-

97. i. TREATMENT OF ACUTE AND SUB-ACUTE RHEUMATISM.—Having taken a view of the modes of treatment and means of cure which have been recommended for these forms of the disease, and having given my opinion respecting them, I shall next state the treatment which I have employed for these forms of rheumatism since the earliest period of my practice, and which I have found most beneficial in the simple forms of the disease, when no complication nor metastasis had supervened. It may, however, be remarked that the treatment of the several forms of rheumatism must necessarily vary with the locality in which persons who are the subjects of them reside, according as the patient resides in the country, in a healthy and dry atmosphere, or in a humid and malarious air; or in a close, low, crowded, and large town, and as he has been well or ill fed and clothed. Neither should it be overlooked that a somewhat different treatment may have been required by our ancestors, who drank malt liquors, and not tea, and spirituous liquors, as in modern times. These latter, taken even in moderation, especially when taken habitually, impair more or less the primary and secondary processes of assimilation, impart more of a nervous character to diseases, and contra-indicate the employment of vascular depletions, unless with caution and in moderation.

98. A. *Blood-letting* was recommended by SYDENHAM at an early period of his practice, and certainly to an extent which could not fail of being injurious in many instances. Of this he appeared to have been afterward convinced; for, in a letter to Dr. BRADY, he admits that it impaired the strength, and favoured attacks of other diseases. He therefore trusted, at a later period of his practice, to a diet consisting chiefly of whey. SYDENHAM had probably been induced to adopt frequent bleedings for this disease at the commencement of his practice by the advice of De BAILLOU or BALLONIUS, and RIVERIUS, who had advised this practice. BOERHAAVE also recommended large blood-letting early in the treatment; but his very able and learned commentator, VAN SWIETEN, and about the same time STORCK, saw reason to be more cautious, and advised it only for the young and plethoric, and when the pulse is strong and full. TISSOT, PRINGLE, D. MONRO, and STOLL, also recommended free or repeated blood-letting, aided by diluents; and the practice was followed by THULENIUS and BANG, and adopted by CULLEN with more reservation, he bringing to its aid local bleedings, diaphoretics, and purgatives. HEBERDEN was still more cautious, and contended that venesection was not suited to the majority of cases, and ought to be prescribed only for robust persons. Dr. FORDYCE had at first recourse to blood-letting; but his experience led him to infer that it favoured the occurrence of internal metastasis, and he therefore abandoned the practice. Dr. FOWLER resorted to bleeding in 41 out of 87 cases, and found that only three were cured, seven much relieved, seven partially relieved, twenty very

little relieved, and four not at all benefited. Dr. LATHAM regarded blood-letting as not required, although he did not object to local bleeding by leeches, as advised by Dr. FOWLER, and trusted chiefly in diaphoretics, diluents, laxatives, and rest. Ultimately, Dr. WELLS and WILLAN came nearly to the same conclusion, as respects the treatment of the disease in London and large towns, namely, that blood-letting is either unnecessary or injurious, by enfeebling the patient and favouring internal translations of the malady. More recently, Mr. BEDINGFIELD and Dr. CRAIGIE have advocated early and large blood-letting. But the former wrote when venesection was a common remedy, and was certainly less prejudicial, as respected the prevailing epidemic constitutions (from 1810 to 1825), than it has been subsequently. Doctor CRAIGIE, practising in Edinburgh, has declared in favour of blood-letting, aided by diaphoretics and cathartics, and contends that, "in order to be beneficial, it ought to be performed early in the disease, and carried to a considerable extent." He considers that the best time is within the first three or four days, or, at all events, within the first week. It should be carried, he adds, "to twenty, twenty-five, or thirty ounces at once, and within twenty-four hours to as much more;" and he attributes the want of success of FOWLER and others to the smallness of the quantity taken. M. BOULLAUD has advocated a somewhat similar practice to the foregoing; but, instead of abstracting at once the quantity advised by Dr. CRAIGIE, he has adopted the abandoned method of SYDENHAM, and has advised a smaller quantity, on more frequent occasions, to be drawn.

99. I believe that the treatment of any form of rheumatism by blood-letting, as a general principle of practice, however early in the disease, to be productive of injury in some cases—of rheumatic inflammations of the internal and external membranes of the heart, of the peritoneum, pleura, synovial membranes, &c.; of delirium, prolonged convalescence, and of the degeneration of the more acute into the chronic states. I will not deny that the robust, or those in the prime of life, who live well and enjoy a wholesome air, will bear full or even copious depletion at an early period of the disease, generally without detriment, and possibly with advantage; but I am convinced that in large cities or towns, in persons employed in warm, ill-ventilated factories, or those living in crowded rooms, low apartments, cellars, &c.; in the very young, and in the old especially; wherever there is any indication of deficiency or poorness of blood; and, *à fortiori*, in the ill-clothed and ill-fed, vascular depletion in any form is often most injurious, and always unnecessary—rarely required, even for the apparently robust, unless it be conjoined with the method of cure which I shall recommend in the sequel (§ 115, *et seq.*).

[We fully agree with Dr. COPLAND in the opinion that blood-letting is not adapted to the treatment of rheumatism as a general rule, and that much injury has resulted from its indiscriminate employment. In very robust habits we have found one venesection early in the disease of considerable advantage, especially when conjoined with antimonials, nitrate of potash, or DOVER's powders; but we have seen so much

rum genera medici neoterici adhibuisse videntur. Nec mirum, quoniam unusquisque eorum, prout ipse de proximo morbi causa judicat, vel huc remedia vel illa adhibet. Eventus felices quos a remediis illis absolutura existimaverint, adici sibi gratulantur, *ἀντοκράτεια* ποτίσας, sive viribus naturæ medicatricibus posse attribui, haud medicis suspicio habenda est."—(*Op. cit.*, p. 22.)

injury from its repeated use that we never resort to its repetition except under very urgent circumstances. When complicated with endocarditis, as it often is, blood-letting, conjoined with mercurials freely administered, is indispensable to control the disease in limine, and prevent those cardiac organic lesions which lead to a fatal result. But even here free cupping and leeching over the præcordial region, aided by a succession of blisters, dressed with mercurial ointment, will often suffice to arrest the inflammatory action and produce speedy resolution. The choice of remedies must, as in all other cases, be determined by the age, constitution, habits, &c., of the patient, and especially by the period and severity of the disease. No rule can be given to meet all cases. American practice in rheumatism, as it seems to us, is more bold than judicious, more haphazard than discriminating, and in many cases more injurious than beneficial.]

100. *B. Mercurials* alone, or *with opium*, have been advised for the acute and sub-acute forms of rheumatism, since the benefit produced by them in inflammations of serous membranes was shown by Dr. HAMILTON. The practice was adopted by NIEMANN, and by many modern writers, with the view of preventing the effusion or formation of coagulable lymph, especially in the internal extensions or metastases of the disease. But there is every reason to believe that mercurials, prescribed so as to produce their specific constitutional effects, will exert but little influence either in removing rheumatism, or in preventing the affection of internal parts; although they, especially calomel, will be of service in removing biliary accumulations and congestions, in rousing the torpid functions of the liver, and, when conjoined with opium, in promoting the excreting functions of the skin: an intention always necessary to be accomplished in rheumatism. But there is another preparation of mercury which, when conjoined with other medicines, is often of service in certain forms of rheumatism, viz., the bichloride; this, when taken in minute doses with the compound decoction, or fluid extract, of sarsa, or with the decoction of cinchona or infusion of serpentaria, &c., is often of great service in some sub-acute and chronic states of rheumatism of the joints. Attempts to cure the more acute forms of rheumatism by salivation, as suggested by some writers, while by no means preventing, if not increasing, the risk of internal metastases, always render convalescence prolonged, and favour the degeneration of the acute and sub-acute into the chronic forms.

101. *C. Emetics*, followed by cholagogue *purgatives* or *ecceprotics*, were much praised by LENTIN, THILENIUS, and STOLL, at a very early period of the disease, and more especially in that state of acute rheumatism which they denominated bilious, or in which biliary disorder was manifestly present. CLOSSIUS recommended the repeated exhibition of emetics. There can be no doubt of the propriety of the practice, in the circumstances just stated, and if the treatment be not otherwise depressing. Emetics have been rarely given in rheumatic fever in recent times; but I have prescribed them in a few cases at the commencement of the attack, conjoining them with warm cardiacs, or aromatics, or stimulants, so as to produce not

only full vomiting, but also copious perspirations, as early in the disease as possible.

102. *Purgatives*, especially cholagogues, are generally required early in the disease, although they have been but little insisted on by writers, excepting BOERHAAVE and a few others. But they should be prescribed only so as to procure a free alvine evacuation and discharge of bile, without occasioning severe catharsis; for a too violent action on the bowels, and more especially if it be conjoined with vomiting, will remarkably risk the suppression of the local affection, and cause some internal complication or metastasis of the disease, as in the very remarkable instance adduced above. In the more acute states of the disease I have usually prescribed, as early as possible, a moderate or full dose of calomel, with ipecacuanha or JAMES'S powder at bed-time, and a purgative draught, as the compound infusions of gentian and senna with the sulphate and carbonate of magnesia, in the morning; the satisfactory operation of these being introductory to other more efficient means. In some instances I have preferred half an ounce each of spirits of turpentine and castor oil, taken on the surface of milk, or of some aromatic water; and when the bowels do not act copiously, an enema, containing about an ounce of turpentine, with ten grains of camphor, or half a drachm of asafetida, and some common salt, will always be most serviceable. The evacuations ought to be carefully examined; and if, from their appearances, there is any reason to infer either the retention of disordered intestinal excretions, or retention or disorder of the biliary secretion, the purgatives now mentioned, or such other as the peculiarities of the case may suggest, avoiding violent measures, should be repeated occasionally, until the motions present a more healthy character. This end is not always attained by prescribing cold saline purgatives; but it will be more certainly and speedily reached by conjoining stomachics and bitters with the purgatives.

103. *D. Diaphoretics* have been recommended by many for all forms of rheumatism, but they are not equally beneficial in all, nor are all diaphoretics equally efficacious. The medicines of this class which are most serviceable are the preparations of *antimony*, either alone or with opium; DOVER'S powder, or ipecacuanha and calomel with opium; the *liquor ammoniac acetatis* with *sesquicarbonate of ammonia*, in full doses, and with the *spiritus atheris nitrici*; *guaiacum*, in the form of decoction or tincture, with *ammonia*; and *camphor* with *nitre* and *opium*, or *camphor* with JAMES'S or DOVER'S powder, or with *antimony*, or with preparations of *ammonia*. Although the most acute states of rheumatism are generally attended by abundant sweats, which produce no relief, yet these do not contra-indicate a recourse to diaphoretics. If this course of treatment be adopted, there are certain points which should receive due attention in connexion with it: 1st. All retained, accumulated, or morbid biliary and intestinal excretions should be previously removed by the means already noticed, so that the patient may not be chilled, during the diaphoretic operation, by getting up to the night-stool. 2d. The patient should be enveloped in, or have next his skin, a long flannel night-gown; or, in default of this, a cotton one; and he should sleep in soft woollen or flan-

nel blankets, or in cotton sheets. 3d. A sufficient supply of warm antacid and saline diluents, and especially an abundance of fresh whey, or of very weak, but fresh mutton or veal tea, or barley water, should be always ready, which may be made the vehicle for diaphoretic or other medicines, and which, taken abundantly, may promote diaphoresis.

104. *a. The antimonial diaphoretics* are the tartar emetic in small doses; JAMES'S powder or antimonial powder, either alone or with other substances, as with alkalies, opium, camphor, &c. The alkalies and magnesia, in the state of carbonate, aid the effect of these, and neutralize the acids present in the prima via. Opium increases or insures a sudorific effect, and is generally of more or less service when thus conjoined, if biliary and intestinal accumulations and retentions have been removed, and when the symptoms are very acute, and when vital power and vascular fullness have not been too much reduced. When, however, the patient has been too freely depleted; or when there is much exhaustion, and especially if the urine indicate much free acid; or if the perspirations have an acid smell, &c., then other diaphoretics are indicated, and antimonials should be relinquished.*

105. *b. The preparations of ammonia*, with or without *guaiaicum*, or the *spiritus ætheris nitrici*, or *camphor*, or other medicines, are then, I believe, the most beneficial. If the *liquor ammoniæ acetatis* be prescribed, it should be conjoined with full doses of the sesquicarbonate of ammonia and the spirits of nitric æther; or, if *guaiaicum* be preferred, it may be given with ammonia or camphor. *Guaiaicum*, either alone or with ammonia, was formerly much employed in rheumatism, and much praised by Dr. FOWLER, and more recently by Dr. SEYMOUR, the former preferring the simple tincture, the latter the mixture of the pharmacopœia. I have prescribed either, but generally in conjunction with large doses of the carbonate of ammonia, or some other alkali, for reasons which will appear hereafter. The gentle operation which it often exerts on the bowels, when given in a sufficient dose, is also advantageous, but its free diaphoretic effect should always be aided by diluents, and by the regimen advised above (§ 103).

106. *c. DOVER'S powder* has been very generally employed in the several more acute states of rheumatism; but it should be prescribed either in its original form, the nitrate of potash being substituted for the sulphate, or the ipecacuanha should be given in larger doses in the form of pill. One grain of ipecacuanha, with one of opium and eight of nitre, should be given in the form of pill every two hours, until three or four doses are taken; and then this dose should not be given oftener than every tenth or twelfth hour, the operation upon the skin and urine being promoted by a copious use of diluents, containing nitre and the sub-carbonate of soda or potash, that may be rendered pleasant by the addition of the usual spices and aromatics. At the commencement of the attack, the ipecacuanha, in doses of two or three grains, may be given with an equal quantity, or somewhat more, of calomel, and a grain of opi-

um, and be followed, after three or four doses, by a stomacheic purgative, or by either of those already mentioned (§ 102); and after the bowels have been evacuated, the ipecacuanha, opium, and nitre may be taken, so as to procure a copious perspiration, which should be promoted by the regimen and medicated diluents already recommended. In some cases I have preferred a combination of ipecacuanha, camphor, and opium, the camphor in doses of three or five grains, with the same quantities of the ipecacuanha and opium as already advised, nitre and carbonate of soda or potash being taken freely, in large quantities of diluents or demulcents.

107. *d. Calomel and opium* have been recommended for their diaphoretic and alterative effect; but they should be given only at the commencement of the disease, and should then be combined, at first, with full doses of ipecacuanha, and afterward with camphor; but after a few doses—not more than three or four—a purgative should be taken, and its operation promoted by an enema (see § 102).

108. *E. The nitrate of potash* was much employed for acute rheumatism by BROCKLESBY, RANOE, and THILENIUS, who gave from one ounce to an ounce and a half in the twenty-four hours, copiously diluted, and continued thus to exhibit it for five or six days, when the disease generally began to subside. I have prescribed it for many years, but not in so large doses, using it chiefly in the drink of the patient with the carbonate of potash or of soda, or prescribing it in the decoction of bark, either combined thus, or with the liquor ammoniæ acetatis, and spiritus ætheris nitrici. The intention of these writers was to excite the skin and kidneys to the due elimination of hurtful materials from the blood; my object being to rouse all the emunctories to increased action, to develop organic nervous energy, and to counteract the morbid disposition and condition of the blood.

[We have known the nitrate of potash used with much benefit in acute rheumatism, in doses of i. ij., or even ʒij. in twenty-four hours, largely diluted. In most cases the pulse remains unaffected, the digestive functions do not suffer, and the urinary secretion is slightly increased in quantity, and has a high specific gravity. The most obvious effect is the abatement of the heat, pain, and swelling in the affected joints, while the tendency to cardiac complication is materially lessened, or, if it exists, is rendered more controllable. It is very probable that the beneficial effects of nitre in this disease may be owing to its property of diminishing the amount of fibrine and increasing the saline constituents of the blood. A solution of the nitrate, and also of the iodide of potash, has been found extremely useful when applied tepid to the affected parts by means of a linen roller or other cloth kept moistened by the solution.]

109. *F. The treatment of acute rheumatism* has been confided chiefly to *opium* by BRUGNATELLI, and more recently by Dr. CORRIGAN. It has been recommended, also, by other writers in large doses, but generally with antimony, ipecacuanha, calomel, &c. I have given as much as seven or eight grains in the twenty-four hours, in the form of the pilula saponis

* [A very good formula in these cases is *Vin. Tart. Ant.*, f. ʒij. *Tinct. opii*, ʒjss. Dose, ʒj. every hour, if the stomach does not reject it.]

comp. of the pharmacopœia; but I have considered the free use of opium most advantageous in conjunction with ipecacuanha or with camphor. In the most acute states of the disease large doses of opium are easily tolerated, especially when conjoined with warm spices or aromatics, or with ipecacuanha and capsicum, and are often indispensable and most beneficial in conjunction with the alkaline and tonic treatment which I have long employed.

110. *G. Peruvian* or *Cinchona bark* was first recommended for acute rheumatism by MORTON. It was, however, objected to by CULLEN, while PRINGLE and HEBERDEN gave only a somewhat favourable, but an undecided, opinion respecting it. HULSE, FOTHERGILL, and SAUNDERS wrote more decidedly in favour of it, and HAYGARTH entered upon an elaborate defence of the use of it for this disease; and his inferences received the support of FORDYCE and WILLAN, although Dr. PARRY offered certain objections to it, which can have no weight when duly examined by the physician who has had any experience of the operation of this medicine in acute rheumatism. I have always employed cinchona for this disease, in various states of combination, since 1819, and have, up to the present day, preferred the decoction of the *cinchona cordifolia*, in full doses, conjoining it with other remedies which the stage and peculiarities of the case have suggested. But the bark should be prescribed as early in the attack as possible; and if the alvine evacuations have not been sufficient, or if biliary and intestinal colliquies still remain, it may be preceded by an emetic, and by a dose of calomel and JAMES'S powder at night and a purgative draught in the morning; or these means may be occasionally resorted to without materially interfering with the due employment of the bark. At an early stage of the more acute cases, I have generally prescribed the decoction of cinchona with the liquor ammoniæ acetatis and nitre, often also with full doses of the spiritus ætheris nitrici, the patient having been allowed a large supply of diluents, consisting either of whey, or of water gruel or barley water containing nitre and the spirits of nitric æther. If the disease was not soon afterward mitigated, the decoction was taken with the liquor ammoniæ acetatis, with sesquicarbonate of ammonia in full doses, and sometimes also, especially if the disease had been of some duration, with the tincture of serpentaria. In cases where the perspiration was copious and the urine scanty, the decoction was prescribed with the carbonate of potash or soda, to which the ammonia and spirits of nitric æther were often added. The patient's drink generally contained an alkali instead of nitre; and the weak animal tea, mentioned above (§ 103), was often given thus medicated, and rendered palatable by spice or aromatics; and while it quenched thirst, it furnished all the nourishment required. In some cases the decoction of bark was given with a preparation of colchicum, but very rarely, unless ammonia in full doses was conjoined with it. (See § 105.)

111. Since the introduction of *sulphate of quina* into practice, the other preparations of cinchona have been much less employed. Yet in rheumatism, as well as in several other diseases, I have preferred the decoction, or the

compound tincture, especially in the combinations just mentioned. In some instances, however, of the sub-acute and chronic disease, I have given the quina with much benefit, especially in conjunction with camphor, in the form of pill; and where there has been much evidence of anæmia, the sulphate of iron has also been added. In some such cases, or when certain peculiarities of the case suggested a combination of tonics and purgatives, then the quina, either alone, or combined as now stated, has been given, in the form of pill, with the purified extract of aloes, or with the compound rhubarb pill, or the aloes and myrrh pill, two or three grains of either acting freely when thus combined.

112. *H. Colchicum* has been much employed in acute and sub-acute rheumatism since 1815 or 1820, but not always with sufficient caution. I have rarely given it, even in the most acute states of the disease, unless in conjunction with cinchona and an alkali; or in the evening and at night, these other medicines having been taken in the morning and during the day. One or two grains of the powder of the cornus, or of the extract, have been thus conjoined with an equal quantity of the powder of capsicum, and with three to six grains of the soap and opium pill; the smaller doses having been taken at six and ten P.M., or the large dose at nine P.M. only; the morning and middle of the day, when the remission of fever is generally observed, having been devoted to the administration of the preparations of cinchona and of the alkalies. The following has been found very serviceable.

No. 331. R Magnesiæ Carbon., gr. xij.; Ammoniæ Carbon., gr. vj.; Vini vel Tinct. Seminum Colchici, ℥ xx. ad ʒss.; Tinct. Cinchoniæ Comp., ʒss. ℥ ʒij.; Tinct. Capsici, ℥ iij.; Tinct. Opii, ℥ v.; Aquæ Cinnam. vel Carui, et Aq. distil., aa, ʒvj. Misce. Fiat Haustus bis terve in die sumendus.

113. *I. Aconite*, in the form of expressed juice, extract, alcoholic extract, or tincture, has been recommended by many in rheumatism, since it was first employed by STOECK, especially by THILENIUS, RANOE, GESNER, and LENTIN. I have tried it in several cases, both simple and complicated, having always preferred the extract or tincture prepared with rectified spirit, and according to the formula recommended by Dr. PEREIRA. Of the former, from one sixth to a fourth or half a grain may be taken every sixth or seventh hour, or from three to five drops of the latter; but either preparation should be given with caution, and the effects duly watched. I have usually prescribed the tincture in distilled water only; and the extract, in the form of pill, intimately mixed with liquorice powder and simple sirup; and directed whichever was prescribed to be taken in the intervals between the administration of the other medicines employed. I have considered the aconite, when cautiously used, as a powerful agent in removing the morbid sensibility and excited vascular action in acute rheumatism; but I have employed it chiefly in aid of the other means already mentioned, especially the decoction of cinchona in the states of combination noticed above (§ 110). In the cardiac or pericardiac complications of the disease it is a valuable auxiliary to other remedies, as will be mentioned hereafter.

114. *K.* A method of cure, which Dr. TODD

has called "*the treatment by elimination*," has very recently been recommended by this physician. "It is probable," he observes, "that the *materies morbi* in rheumatic fever is lactic acid. We know that the natural emunctory of this is the skin. Many chemists maintain that it will also escape by the kidneys; and if it ever does so, perhaps this is more likely during rheumatic fever than at any other time." The indications he suggests, in conformity with this view, are "to promote the action of the skin, the kidneys, and the bowels; to use antacid remedies, and to give large quantities of fluid for the free dilution of the *materies morbi*, and in aid of the drainage by diaphoresis and diuresis."—(*Lond. Med. Gaz.*, vol. xlii., p. 573.) To obtain these ends, he recommends DOVER'S powder, and the other means usually employed. But I may remark that this acid is not the only *materies morbi*: there is an increase of fibrine and colourless corpuscles in the blood, as shown above (§ 62), and when treating of rheumatic inflammation of the surfaces of the HEART (§ 20, 129-133), with a disposition to their exudation on the serous surfaces, especially those of this organ, while the quantity of red globules is diminished. The predominance of acid has been long ago contended for; but whether the acid is formed in the stomach, as Dr. TODD supposes, or by the emunctories from the constituents of it existing in the blood, or partly by both, has not been satisfactorily shown. However this may be, the treatment it suggests has been long employed in acute rheumatism, as already noticed (§ 84). The means of cure, however, should not be limited to this single morbid material, but be extended so as to comprise other changes in the blood and nervous system, which, as Dr. TODD very judiciously argues, and as was shown above, and when describing the treatment of *rheumatic endocarditis and pericarditis* (see art. HEART, § 144, *et seq.*), can never be removed by blood-letting alone. Indeed, in many cases of the disease, especially in those of some duration, and when there is a deficiency of red globules inferred, I have prescribed the preparations of iron, as the oxides or carbonates, with the carbonate of some one of the alkalies.

115. II. TREATMENT ADVISED BY THE AUTHOR. —This may be partly inferred from the remarks already made; but it depends much on the duration, seat, and form of the disease, and upon the means which have been already resorted to. The indications or intentions of cure should be directed to the removal of the morbid conditions which constitute the disease, as far as these are known, and as far as experience may have proved the efficiency of the means recommended for this purpose. We should more especially endeavour to develop organic nervous energy, so as to promote the assimilating, the depurating, and excreting functions; to diminish morbid sensibility; to counteract whatever disposition may exist to form acid in the *prima via*; to remove from the blood, or to neutralize the materials from which acid is formed, as well as whatever acid may be present; to increase the quantity of red globules in the blood when these are deficient; to correct the morbid condition of the liquor sanguinis; and to prevent the exuberance of fibrine and the tendency of it to concrete, and to exude in the

form of a fibrinous plasma or lymph, on serous surfaces. As a prelude, however, to the administration of such means as may seem most efficient in attaining these ends, disordered or accumulated secretions and excretions should be evacuated by appropriate agents; by medicines which moderately evacuate without occasioning vital depression or exhaustion.

116. A. If the patient be seen by the physician early in the attack, and if the symptoms are *acute*, he should be placed in a strong flannel night-gown, or between flannel or soft woolen blankets; the other parts of the regimen specified above (§ 103) being also observed. If there be no cardiac complication, if bilious colicuvies be inferred to exist, if the tongue be loaded or covered by a yellowish fur, and if the alvine excretions have not been hitherto natural or free, an *emetic*, consisting either of ipecacuanha or sulphate of zinc, with two or three grains of capsicum, should be given, and its operation promoted by drinking a warm infusion of chamomile flowers. Soon after the emetic action has ceased, especially towards evening or night, four or five grains of *calomel*, and one and a half or two of *ipecacuanha*, and an equal quantity of *opium* and *capsicum*, should be taken, and be repeated in five or six hours, if a free perspiration or some action on the bowels has not resulted from the first dose. If the bowels continue insufficiently open four or five hours after the second dose, or the stools offensive or morbid, a *purgative* draught may be given; or an *enema*, containing an ounce of *turpentine* and two of *sweet oil*, with a scruple of *asafoetida*, ten grains of *camphor*, and a little salt, may be administered. Fæcal and bilious accumulations having been evacuated by these means, the decoction of *cinchona* ought then to be given in such combinations as the existing state of the patient will suggest; with liquor ammoniæ acetatis, spiritus ætheris nitrici, and nitras potassæ, if the febrile action is great and the urine scanty and high-coloured, and at an early stage; with the carbonate of the alkalies, or with ammonia or magnesia and colchicum; or with either of the alkalies and serpentaria, if the disease is farther advanced. During the liberal use of *cinchona*, of alkalies, &c., the states of the bowels and of the urine and perspiration should be carefully watched. If the bowels are not sufficiently open, a dose of *calomel*, *ipecacuanha*, and *opium* may be given at night, and a draught, with half an ounce each of *turpentine* and *castor oil*, in the morning. If the biliary and intestinal excretions are sufficiently free, two grains each of *opium* and of *ipecacuanha*, with five of *nitre*, or three of *camphor*, may be taken in the evening. If the excretions manifest much acidity, the alkalies should be given liberally, both in the patient's medicine and in his drinks; and if the pain continue severe, notwithstanding the liberal employment of them, either an increased dose of *opium* should be given at night, or ammonia and colchicum, as noticed above (§ 110, 112), ought to be added to the *cinchona* and the alkali. I have rarely found the above means fail of producing a very decided relief in the course of three or four days, when commenced early, and when no cardiac or other complication exists. But when a joint is attacked, some external means, especially such as I shall here-

after suggest, may also be employed with advantage.

117. *B.* In more prolonged cases, and when the disease had not been seen during its early stage, instead of the colchicum I have prescribed the *aconite*, as noticed above, in the intervals between the taking of the cinchona and alkalies; and in those cases where the patient has been reduced by the duration of the disease, or by vascular depletions, or where a deficiency of the red globules of the blood was inferred, I have employed with marked advantage the *iodide of iron* in the sirup of sarza, and the compound decoction or fluid extract of sarza. This medicine was of the most remarkable and immediate service in the case of a medical officer from India, which presented features of the greatest severity and obstinacy, no other substance, excepting an occasional purgative, having been required to effect a cure, which took place in a very short time.

118. In the class of acute cases now being considered—in the prolonged, neglected, or injudiciously treated, where the red globules appear to be deficient, but where no internal complication or metastasis can be detected—the preparations of *iron* with the carbonates of the *alkalies*, especially the *mistura ferri composita*, with the addition of the carbonate of potash or soda, will be found of great service. The following pills will also be most beneficial. If the bowels be confined, from five to ten grains of the extr. aloes purificat. may be added to the mass.

No. 332. *R Ferri Sulphatis*, gr. xij.; *Quinæ Disulphatis*, gr. xvij.; *Camphoræ rasæ*, gr. xij.; *Pulv. Capsici*, gr. vi. *Pilulas Galbani comp.*, 5j.; *Sirupi Tolutani*, q. s. misce, et contunde bene. Divide massam in *Pilulas* xxiv.; e quibus sumatur binæ vel tres, ter in die.

119. *G.* When the disease attacks the large joints in the *capsular* or *sub-acute* form, the application of leeches has been advised, especially if external redness or swelling is observed. The practice is of service in recent attacks, and in young or robust persons, more particularly if the internal treatment be such as I have already recommended, or am about to suggest. The number of leeches* should depend upon

* The mode in which *local blood-letting* is practised in the Shetland Isles is curious. I here adduce the description I have given of it in another place. I have seen a similar mode adopted by the native Africans on the Grain, Ivory, and Gold Coasts; the only difference being that, instead of a ram's horn, the chief instrument in the operation among the native Zetlanders, a small gourd is employed by the Africans, as it was from the earliest times in countries bordering on the Mediterranean.—“*Mentio hujus rei, quæ quidem in insulis Zetlandicis mihi contigit vidisse, ea mihi in mentem reducit. Scarificat et sanguinem ab ultimis usque temporibus hoc modo eliciunt. Quam partem volunt scarificare, hanc aquâ calidâ fovunt. Qui medici partes agit, is eutem sexies aut septies novacula perquam leviter perstrigit, et cornu arietinum modicè recurvum, quod cucurbitulæ vice fungitur, apicem perforato, et corio molli circumdato, partem leviter resectam applicat. Tunc foramini labia admovent, et quantum fieri poterit, tæra inclusum exsugit. Quom cornu exinanisset, corio torquendo et in foramen linguâ protrudendo aëris irruentis impetum prohibet. Postquam cornu partem scarificatam arripit, deinde pannos ex aquâ calidâ paulum exsiccatis circa ipsum cornu superimponit, qui sanguinem ad partem provocant. Quom sanguinis semiplenum sit, cornu tum eutem relinquit et decedit. Eadem res iterum et iterum repetitur, donec satis sanguinis mittatur. Mulieres et marces, scarificatione et cornu hujusmodi uti vidimus. Res memoratu forsitan digna est, ut enim Romani antiquiores cucurbitis, sive Getæ (sive quis eos Gothos nominare malit), et omnes eorum posterî, cornibus ad sanguinem eliciendum uti videntur.*”

the circumstances of the case; but the benefit derived from them will be only temporary, unless the internal means used at the same time be appropriate, and unless the rest of the external treatment following the application of leeches be suitable to the local affection. After faecal accumulations and disordered secretions and excretions have been evacuated, the means already prescribed (§ 116, *et seq.*) should be employed; and if the more acute symptoms lapse into the sub-acute, or if a joint becomes especially affected, or if effusion within the capsule takes place, the decoction of cinchona may be given with the *iodide of potassium*, and the solution or the sub-carbonate of potash. In these cases, it is important to procure a speedy absorption of the effused fluid as possible, and thereby to prevent the irritating effects of this fluid on the membranes inclosing it. This end will be best obtained by subduing, by the internal means already advised, the morbid action in the joint, by correcting the altered state of the circulating fluid, and by procuring a free discharge from the external surface of the joint. After the operation of leeches, in such cases as may appear to require them, or without having recourse to them in other cases, where they are contra-indicated by the local or constitutional symptoms—when there is little or no local redness, and no marked increase of heat, but considerable intra-capsular swelling—small or moderate-sized blisters may be placed near each side of the joint, as when the knee is affected, and these may be repeated, or kept discharging, according to the effects produced. In other respects, the treatment of this form of the disease, as well as of the other sub-acute states, may be conducted conformably with the views already entertained. It may, however, be remarked, that the preparation of iodine, conjoined with cinchona, alkalies, &c., or with iron, sarsaparilla, &c., when there is a deficiency of red globules, are more especially indicated in these forms of the complaint; and that colchicum, conjoined with the iodide of potassium, the alkalies, and cinchona, in these forms, is often very beneficial, especially in the more active states. When the disease attacks the more superficial joints, leeches and blisters should not be placed immediately over the joint, but at a short distance from it, so as to occasion a derivation of the morbid action from the affected parts.

120. In some cases of acute and sub-acute rheumatism, I have employed the *oil of turpentine* differently from the manner noticed above. After having evacuated disordered alvine secretions and excretions, and given a few doses of the decoction of cinchona, with an alkali and nitre, I have occasionally prescribed this oil in the following, or in a similar manner; endeavouring, however, at the same time, to preserve the bowels sufficiently open, and to prevent the irritating action of the oil on the kidneys, by a liberal use of demulcents containing nitre and an alkaline carbonate:

No. 333. *R Olei Terebinthinæ*, 5j.; *Sodæ vel Potassæ Bicarbon.*, 5j.; *Tinct. Cinchonæ Comp.*, ʒjss.; *Tinct. Capsici*, ℥ v.; *Aquæ Menthae Piperitæ*, 5jss. Misce. Fiat haustus bis terve in die sumendus.

121. *iii. THE CHRONIC FORMS of rheumatism.* when they appear primarily, more especially in an *active form*, or with nocturnal exacerbations,

should be treated very nearly on the principles now stated.—(a) After evacuating morbid accumulations and excretions, the decoction of *cinchona*, or the *guaiacum* mixture, may be given with *alkalies* and with *colchicum*. The preparations of *guaiacum*, especially when thus combined, and after the biliary and alvine secretions have been duly evacuated and promoted, I have always found more or less beneficial in this state of the disease, as well as in the sub-acute and in the more *passive* conditions. The good effects of these are more certainly secured if free excretion by the several emunctories be promoted by a liberal use of diluents, more especially those already mentioned (§ 103).

122. (b) In the states of the complaint now being considered, as well as in the advanced stages of the acute, and in the sub-acute and arthritic forms, manifest advantage will accrue from the *iodide of potassium* in such combinations as the experience and tact of the physician will suggest, more particularly when given in the decoction of bark or in the *guaiacum* mixture, with the solution of potash, or of carbonate of potash, or with *colchicum*, or *aconite*. Besides the forms of the disease just mentioned, both the active and passive states of chronic rheumatism will be remarkably ameliorated by these means, which may be aided by the external measures about to be noticed, and by a suitable diet and regimen. In these states of combination I have found the *iodide of potassium* extremely beneficial, and while less than two grains, given thrice daily, were rarely prescribed, more than five grains were as rarely taken at one dose, a free use of diluents being always allowed.*

123. c. *The cod-liver oil* once enjoyed a considerable reputation for the cure of the sub-acute and chronic forms of rheumatism, and was much employed in Manchester since 1766, when it was first introduced by Drs. KAY and PERCIVAL. Owing to the writings of this latter physician, and the reports of Dr. BARDSEY, it came into use in Germany, where it is now one of the most commonly used medicines for the chronic forms of the disease. The work of Dr. HUGHES BENNETT on this oil has revived the credit of this remedy for rheumatism; and it is now very generally prescribed for some obstinate states of the complaint. It has from time immemorial been employed as a popular remedy for this and some other chronic disorders, both in Norway and in the Shetland Isles; the liver of the torsk, the *Gadus brosme*, being, however, preferred to that of the cod, the *Gadus morhua*. The oil prepared in the manner described by my friend Dr. EDMONDSTON, of Shetland, in his communication to Dr. HUGHES BENNETT, is that which I believe to be the best. This latter physician has adduced the opinions of the earlier writers on this oil, and added his own, which are both discriminating and judicious. Dr. PERCIVAL remarks, that he had the fullest evidence of the successful exhibition of it in rheumatic complaints, and considered it

superior to the preparations of *guaiacum*. Dr. BARDSEY, much later, 1807, states that he is enabled to speak of it, from long experience, "as a medicine of efficacious but limited powers. In some instances, where every means has proved unsuccessful, it has operated in a manner so decidedly beneficial as to excite astonishment." The circumstances under which he found it most advantageous were, 1st. In the chronic rheumatism of elderly persons, when the muscles and tendons have become rigid, and the joints nearly inflexible, owing to excessive labour, dampness, hard fare, and cold; 2d. In women whose constitutions have been worn out by repeated rheumatic attacks after parturition, and more especially in the decline of life. Dr. HUGHES BENNETT states that, judging from the mass of observations published in the German periodicals, and from what he has heard and seen connected with this subject, he considers this oil to be more especially indicated in three distinct forms of chronic rheumatism and gout, which may be denominated the general, erratic, and local.

124. I have prescribed the cod-liver oil in several cases of rheumatism since 1844, and chiefly in similar cases to those mentioned by Dr. BARDSEY, and certainly with nearly similar results, the quantity having been from two to three or four table-spoonfuls in the course of the day. It was commonly taken on the surface of milk, of cold coffee, or mint-water, or of some aromatic water; and, in some cases, on the surface of the infusion of orange peel, to which a small quantity of the *iodide of potassium* was added. In two cases of sciatica in elderly persons it was quite successful; but in two cases of erratic chronic rheumatism, for which the patients had been, and still continued, in the habit of resorting to opium, the oil had no effect. Was this result to be ascribed to the influence of opium on the system? Much useful information on this subject will be obtained from Dr. H. BENNETT's treatise, referred to in the BIBLIOGRAPHY to this article.—(*Op. cit.*, p. 70-92.)

125. (d) *The compound decoction of sarza*, or the fluid extract of *sarza*, largely diluted, especially when conjoined with the solution of potash or the sub-carbonate of potash and the *iodide of potassium*, I have found one of the best medicines for the cure of the chronic and sub-acute forms of rheumatism. In order, however, to secure the good effects of this combination, the functions of the skin should be freely promoted by regular exercise in the open air; and the other secretions and excretions ought also to receive due attention. I have preferred the compound decoction of *sarza* to other preparations, in doses of about six ounces or half a pint, twice or thrice daily, as it produces a much more decided effect upon the skin, especially when taken in a tepid or warm state.

126. (e) *The decoction of senega* is also often extremely beneficial, when conjoined with the *iodide of potassium* and potash, and with some aromatic water, which will enable the stomach to tolerate this decoction in full doses. In the complications of rheumatism with endocarditis or pericarditis, the combination of this decoction with the substances just mentioned is often most beneficial. It was found most efficacious in several cases of this complication

* [The *Iodide of Potash* is a more valuable remedy in rheumatism than might be inferred from the slight mention made of it by our author. We have used it for many years with the most decided benefit in this disease, giving it to the extent of ʒj. or more in twenty-four hours. In some cases it is found to arrest or control the disease very promptly. This is preferable to any of the other preparations of iodine in these cases.]

which came under my care, two of these cases having occurred in medical men. While this decoction, especially as thus combined, promotes the excretions, it also tranquillizes the increased action of the heart. It may be given in the sub-acute, as well as in the several forms of the chronic disease.

127. (f) The *Datura stramonium*, or thorn-apple, first employed for rheumatism by STORCK, and subsequently by WEDENBURG and OPHELIUS, and by COOPER and BARTRAM in America, has been found of service in the chronic and sub-acute forms of the complaint, and especially in sciatica and other cases of nervous rheumatism. It may be given in the form of extract, thrice daily, commencing with a quarter or half a grain, and increasing the dose until dilatation of the pupil and giddiness are produced. I have prescribed this medicine in a few cases; but although it had considerable effect in alleviating the pain, the benefit derived from it was generally transitory. The *Rhododendron chrysanthum* has been recommended for the sub-acute and chronic forms of rheumatism by PALLAS, HOME, KOELPIN, LOEFFLER, WILLI-MET, and others. I have no experience of its use in this disease, but Dr. CRAIGIE remarks, that two drachms of the dried leaves may be infused in ten ounces of boiling water all night, and the strained liquor may be taken either at once or in divided doses during the day; and that a repetition of the remedy for three or four days in succession generally effects a cure in the forms of the complaint just specified. Very probably this infusion, as well as the extract of stramonium, may prove much more beneficial when conjoined with alkaline medicines, or with other substances already mentioned, than when given alone; but under any circumstances the effects should be carefully watched.

128. (g.) *Arsenical preparations* have been recommended for the more chronic states of rheumatism by JENKINSON and others. Dr. BARDSEY considered them to be of essential service in these states of the disease when conjoined with opium. I have recently given, in a very few instances, the combination of the iodide of arsenic and mercury—the liquor iodidi arsenici et hydrargyri as prepared in DONOVAN'S solution, both with and without opium; and in these this solution appeared of service; but it requires a further trial before a decided opinion as to its merits in this disease can be given.

129. (h) *Naphtha* was prescribed for chronic rheumatism by THOMANN, and several forms of *bitumen*, *rock-oil*, or *Barbadoes tar*, or *petroleum*, have also been employed, most frequently as popular remedies. The petroleum is used both internally, as a sudorific, in doses of from ten minims to half a drachm, three or four times daily, and externally as a liniment or embrocation. The substance called *British oil*, procured by distillation from the stone-coal of Shropshire and Wales, and the empyreumatic oil obtained during the formation of coal gas, are also popular remedies for this complaint. Of these I have had no experience, but I have seen very decided benefit produced by the use of *tar-water*, and of the Norwegian *tar*, this latter being taken in the form of pill with liquorice-root powder and magnesia. The exaggerated accounts of the virtues of tar and tar-water, which appeared at the commencement of the last centu-

ry, and the ridicule to which the use of it was soon afterward subjected, have led to the disuse of a substance which is calculated to produce very salutary effects when judiciously employed, not only in chronic rheumatism, but also in several chronic and cachectic diseases.

130. (i) Besides the cod-liver and empyreumatic oils just mentioned, several *vegetable* or *essential oils* have been recommended by writers, both internally and externally, for rheumatism. I need not here add to what I have already stated in favour of *turpentine*. It was many years ago praised by KOELER and myself as an internal and external remedy for this disease; and the *cajeput oil*, much used in the East, and brought to the notice of European physicians, is often a useful adjunct to turpentine, especially in the external use of this latter substance. It should not be overlooked that *olive oil* was recommended, both internally and externally, for chronic rheumatism by BROCKLESEBURY; and, when taken frequently, or in sufficient quantity, and so as to preserve a regular state of the intestinal secretions and excretions, it is certainly of considerable service.

131. (k) *Sulphur* has long been employed as a popular remedy in both the active and passive states of chronic rheumatism, although it has been overlooked by writers with reference to this complaint. The precipitated sulphur may be taken nightly, either alone or with the carbonate of magnesia, this combination being preferred when, with a dry or harsh state of the skin, there is flatulence or acidity of the *prima via*. It exerts a very decided effect upon the functions of the skin, both promoting and altering the excretions from this surface, an intention of the greatest importance in the chronic and sub-acute forms of this complaint. I have usually prescribed the following every night, exhibiting occasionally, or once in the week, a purgative draught in the morning, consisting either of the compound decoction of aloes, or of equal parts of the compound infusions of senna and gentian with sulphate of magnesia, &c.

No. 334. R. Sulphuris præcipit., ʒvj.; Magnesiae Carbon., ʒss.; Pulv. Rad. Glycyrrh., ʒjss.; Pulv. Zingiberis, ʒj. Misce. Capiat æger cochl. j. vel ij. minima, in aqua vel lactis pauxillo, omni nocte.

[We have for several years past treated rheumatism on the plan of *elimination*, or the removal from the system, through the several excretories, of the *materies morbi*, which, with Drs. WILLIAMS, TODD, and others, we hold to be chiefly *lactic acid*. This is the product of vitiated digestion, as well as of the decomposition of the tissues, and under ordinary circumstances of health it is carried off through the medium of the skin, though a portion also escapes through the intestinal canal and the kidneys, as stated by Dr. TODD. The indications then are, as this writer suggests, to increase the natural functions of the skin, kidneys, and bowels; to use antacids and fluids in large quantities, to dilute the morbid matters and aid the operation of diaphoretic and diuretic remedies.

One of the best modes of effecting elimination and removing the disease is, in conjunction with the vapour bath, to give a powder composed of opium, ipecacuanha, and nitrate of potash, in variable quantities, every two, three, or six hours, according to the urgency of the

symptoms, increasing the quantity of opium if there is much pain present, or if a full anodyne effect is desired. It is important to allay the erethism of the nervous system, while at the same time we operate upon the skin and kidneys. In many cases a mild mercurial, as calomel or blue pill, may be substituted for the nitre with advantage. The bowels are to be kept, in the meantime, freely open by small doses of a solution of the sulphate of magnesia, in which a portion of calcined magnesia is blended. We generally aim to procure two or three evacuations in twenty-four hours, being careful, however, not to lower the vital forces by purging too freely, nor by depressing doses of antimony, as is too often witnessed. We have never derived much benefit from leeching the swollen and painful joints in these cases, as the inflammation is pretty certain to recur, or to attack other joints, when the same results follow on a repetition of the local treatment. The best plan is to envelop them in a large quantity of cotton batting, over which a piece of oiled silk is carefully bound, to prevent the access of the atmospheric air; by which means, if the patient be quiet, the limb is steeped in a pleasant vapour bath, the perspiration which is thus elicited having a strong *acid* smell. The same treatment is found most beneficial also in gout. If the pain is aggravated by the heat, thus confined, the cotton is to be removed and a lighter covering substituted. The continuance of the treatment must depend on the nature and persistence of the symptoms. The food is to be nutritious, and liberal in quantity, remembering to enjoin the free use of diluents containing a small quantity of bicarbonate of soda. Pure air, suitable clothing, absolute rest, and a cheerful mind are powerful auxiliaries in accomplishing a speedy cure. Since we have adopted the above plan, which is in substance that advised by Dr. Todd, we have rarely failed in controlling attacks of acute rheumatism in a very few days.]

132. iv. OF VARIOUS OTHER MEDICINES WHICH HAVE BEEN ADVISED FOR THE SEVERAL FORMS OF RHEUMATISM.—Having noticed the plans and means of cure most appropriate to the principal forms of rheumatism respectively, I shall briefly mention some others which have been employed more indiscriminately, especially by some writers, and remark upon their application to certain states of the complaint, *before I proceed to notice those external measures and regimens which have at sundry times and by numerous authors been recommended to the profession and the public.*

133. (a) *Of purgatives*, little mention may be here made beyond what has been stated when treating of acute rheumatism (§ 102). This class of medicines was much employed in the several forms of the disease by RIVERIUS and BUCHHAYE, and in the bilious complications by STOLL and others. They are certainly required in all circumstances, especially early in an attack, but only to the extent of completely evacuating all fecal accumulations, and morbid secretions and excretions, and of preserving and promoting a free discharge of these. If employed beyond this intention, they may reduce vital power and resistance without producing any beneficial effect on the disease in any of its forms. The choice of purgatives and aperients

in this complaint is always a matter of importance. I have already remarked on this topic (§ 102), but I may here add, that the stomachic, warm, or cardiac should be preferred, and that these may be conjoined with alkalies or other deobstruents.

134. (b) *Emetic tartar* was much employed in small doses by BROCKLESBURY, and much more recently by BALFOUR, in all the forms of the complaint; but it has most commonly been conjoined with opium or with other diaphoretics. Unless JAMES's powder, it is the only preparation of antimony on which reliance should be placed in this complaint. It is most appropriate in hot, dry, or harsh states of the skin; when the pulse is tolerably strong and full, and when the cutaneous excretion has been suddenly suppressed; but attempts at the restoration of this excretion should be made by other diaphoretics, when constitutional power is much depressed, and the pulse is very rapid or compressible, more especially by the liquor ammoniac acetatis, with excess of ammonia, with camphor, and with the spiritus ætheris nitrici in full doses.

135. (c) Various *narcotics* and *sedatives*, besides those already noticed, have been advised for the several forms of rheumatism. Of the preparations of *opium*, *morphia*, &c., as well as those of *colchicum*, I may here remark that they should rarely be confided in alone, or given, unless in such combinations as will promote their excreting operations—the former by the skin, the latter by the intestines and kidneys—and at the same time prevent, especially as regards *colchicum*, their depressing influence on the nervous system, the combination with ammonia being one of the best which can be employed. In chronic forms of rheumatism, the preparations of *colchicum* are productive only of temporary benefit, and are often prejudicial, unless conjoined with cinchona, or quina, or with guaiacum, or with camphor or alkalies. *Aconite* is most appropriate to the more acute states of the disease, and to certain complications about to be noticed. *Conium*, which was praised by STROERCK, has comparatively little influence, unless continued in considerable doses. It is most serviceable in the forms of rheumatism which occur in females, and which are consequent upon suppression, interruption, or difficulty of the catamenia; and in these circumstances the *stramonium*, and even *digitalis*, are often of service, especially when conjoined with aloetic aperients, or with the iodide of iron, or with the biborate of soda, or with capsicum, according to the peculiarities of the case.

136. (d) Several *stimulants* have been advised for the more chronic states of the disease.—*a. Phosphorus* was recommended by BUCHNER and HUFELAND; but it is a too hazardous medicine to deserve adoption unless with great caution. The phosphoric acid, which may be employed with safety, has not been hitherto prescribed for this complaint. Probably neither this acid nor the mineral acids may be appropriate in rheumatic cases, unless in as far as they may promote the digestive and primary assimilative functions, and may thereby prevent the generation of the lactic and uric acids.—*β. Asafœtida* was praised by THEDEN in the chronic states of the disease; and certainly both it and several other of the *gum-resins* and

balsams are not devoid of efficacy in these states, especially when used as adjuncts to other appropriate means. I have prescribed the *Peruvian balsam* in some instances with very decided success.—*γ. Mezercon* has been employed by some writers; but it is in combination with *sarza* and *sassafras* and *guaiacum*, as in the compound decoction of *sarza*, that it is most serviceable.—*δ. The Gum urbanum* has been recommended by BUCHHAVE; the *Solanum dulcamara* by LINNÆUS, PRESSAVIN, and VIEUSSEUX; and the bark of the *Magnolia glauca*, which is tonic and aromatic, by BARTON. An infusion of either of these may be made the vehicle of other medicines, may promote the cutaneous functions, and, by this operation, as well as by their stimulant and tonic action on the organic nervous system, may remove attacks of the disease.—*ε. The Trifolium fibrinum* was praised by AASKIEM and BROCKLESBY in the form of infusion, with the volatile tincture of *guaiacum*.—*ζ. The Phytolacca decandra* was prescribed by BARTON. My friend, Professor DUNGLISON, remarks that it is celebrated as a remedy for chronic rheumatism, and is given in the form of tincture of the ripe berries. An infusion and an extract of the leaves of the *Taxus baccata*, or yew tree, have been given in this complaint, but I am not acquainted with the results.—*η. The powder or extract of nux vomica* has been recommended by OBERTEUFER in chronic rheumatism, and for the removal of the stiffness and partial palsy of the limbs often attending the complaint. I have tried the alcoholic extract in a few instances, in doses of a quarter of a grain increased to a grain, twice or thrice daily, preferring it to strychnine. It will be found of service in very chronic cases, when aided by other means; but it is apt to produce headache, which, however, may sometimes be prevented by conjoining it with aperients, as the purified extract of aloes, soap, and the ox-gall.—*Capsicum*, or Cayenne pepper, was praised by ADAIR. It is the common resource of many of the dark races, especially the Negro, in all the chronic and sub-acute states of rheumatism; and while they use it abundantly internally, they apply it externally over the pained part. I have frequently had recourse to it, but chiefly as an adjunct to other means, and it has in this way always appeared to be of service.—*Mustard seed* has also been given by ADAIR. About 1825 it was an almost universal popular medicine, not only for rheumatism, but for all diseases. It soon, however, fell into disuse; most probably because it really possessed some claims to attention in chronic rheumatism.*—The *athers* and *atheral preparations* have been prescribed for the several forms of rheumatism, but chiefly as adjuncts to other means; and probably *chloroform* will soon be added to the list of means available in the

more acute or neuralgic states of this complaint, and be exhibited either by the mouth or by inhalation, the former being obviously the safest method.

137. *V. OF VARIOUS EXTERNAL MEANS RECOMMENDED BY WRITERS.*—All external means of cure, unless employed as adjuvants of internal remedies, and judiciously prescribed, are attended, either immediately or remotely, by more or less risk. Rheumatism, in all its forms, is an external manifestation of a constitutional malady, in which the organic nervous and vascular systems and blood are chiefly affected; and if this manifestation be suppressed in one quarter, before the evil is removed in the systems more especially implicated, it will most assuredly appear in some other quarter, and not improbably in some important or vital organ. External means, excepting such as promote the depurating functions of the skin, ought therefore never to be resorted to unless in aid of, and contemporaneously with, or consecutively of, appropriate internal or constitutional treatment.

138. (*a*) Of the numerous external means and applications which have been recommended for the different varieties of this disease, the *selection* is most difficult, and it should be guided entirely by the peculiarities and duration of the attack. The number of these means, although not so great as that of internal remedies, is almost sufficient to distract the inexperienced when an attempt is made to employ them appropriately to the circumstances of the case. Yet will a due knowledge and recognition of these circumstances and peculiarities prove the best guides to the selection of them, and to the periods of having recourse to them, this knowledge constituting the best kind of experience; for without it experience is only gross empiricism. The enumeration of this class of means may in itself appear somewhat formidable; but it will furnish, with the remarks which I shall append to each, an imperfect guide upon which the reflecting practitioner will make the required improvements when he comes to apply them to practice.

139. (*b*) *Acrid topical applications* of various kinds, and *irritating plasters*, have been employed empirically as domestic means, and prescribed professionally. LENTIN and others have recommended them; but BANG, the very practical writer of Copenhagen, considers them not devoid of risk, unless they are prescribed in aid of judicious internal remedies. Sinapisms, the moistened bark of the mezeorum, and various similar applications have been resorted to, and often with benefit, *when vital energy is duly supported, and when the excreting functions are promoted at the same time*: a principle of cure which ought never to be overlooked in the treatment of diseases caused by depressing causes, and attended by pain and impaired power as well as by morbid states of the circulating fluids.

140. (*c*) *Acupuncture*, or the gradual introduction of a sharp and fine needle or metallic wire through the integuments down to the seat of the complaint, in very painful cases of muscular or aponeurotic rheumatism, has been practised for many ages in the Far East, especially in Japan and China. It was treated of, and the safety of the practice shown, as well as the temporary efficacy of it, by Mr. CHURCHILL;

* A credulous disposition to believe in quackeries of some kind or other—religious, political, and medical—is inseparable from the English character; and the more absurd the doctrine, the more ridiculous the means, the more gross the humbug and imposture, the more credence such impositions acquire, and the more generally are they adopted, not by the ignorant only, but by the elevated in rank and social position more especially. The public resemble a flock of sheep, of which, when one breaks off in an eccentric direction, all run the same way. A factious contemporary would be inclined to impute this tendency to the quantity of mutton annually devoured by our countrymen.

and it was also frequently employed in France. I have seen it resorted to in several instances with some success, but I am not aware of much permanent benefit having been produced by it. The practice has fallen into its deserved disuse.

141. (*d*) *Artificial eruptions* have been resorted to in rheumatism, more especially in chronic and sub-acute cases, by THILENIUS, LENTIN, PRÉDÉRIT, VICAT, ANTENRIETH, and JENNER; and emetic tartar, added to an ointment or plaster, has been commonly used to produce these eruptions, which, however, especially when plasters have been employed and allowed to remain too long, or when the constitution has been cachectic, has sometimes been followed by foul, spreading, and obstinate ulcers. If resorted to at all, they should be watched; and they ought not to be produced immediately over a joint, although they may be brought out in the vicinity in obstinate cases. I tried them many years ago in dispensary practice, in several internal complications of rheumatism, with but little or doubtful advantage.

142. (*e*) *Baths, warm, vapour, and medicated*, have been long recommended for the more chronic cases of the disease. Of thermal mineral baths mention will be made hereafter, but considerable advantage will often be derived from warm baths, which may be prepared at any place, under due direction, and which may be general or local, according to the peculiarities of the case. *Warm baths*, at a high temperature, or *vapour baths*, are generally most beneficial in chronic, passive, or cold states of the complaint, and for these the addition of salt or mustard, or both, to the warm bath, whether general or local, will be of service. Even when *sea water* is used for a warm bath these additions are often of service, especially when the regimen and internal treatment are judicious. But baths are not confined to chronic cases only. Even in the sub-acute and acute states benefit will be derived from warm baths of a somewhat lower temperature, or tepid baths, containing an *alkali*, or *alkaline sub-carbonate*. Indeed, *warm alkaline baths* will be found useful in both states of the disease, and more particularly when the skin is hot, dry, and harsh, during the evening and early part of the night. — *Vapour baths*, both general and local, have been much recommended by DU MOULIN, BARDSLEY, and BLEGBOROUGH, and their efficacy is undoubted in chronic cases, especially when the joints are affected, and when aided by a restorative treatment and regimen, and due exercise in the open air. — *Sulphur baths* have been employed with marked benefit in similar cases, and warm baths containing the sulphuret of potash have also been resorted to. These baths, general or local, or in whatever way they may be *medicated*, should be employed chiefly in aid of judicious internal treatment, and of a proper regimen.

143. (*f*) The *warm douche* and *vapour applied locally* have been found of service in many cases; but the remarks just offered are equally applicable to the use of these. To obtain advantage from them, they ought to be daily employed, to be followed by friction, exercise, and warm clothing, and accompanied by the internal treatment recommended above.

144. (*g*) *Blisters* have been generally employ-

ed as external or local aids of constitutional means; but unless these latter means are appropriate, the benefit derived from blisters is only temporary. FOWLER, ROUPPE, and others have advised them; but HUFELAND, finding the advantage procured from them by no means permanent, recommended them to be kept open by the substances usually employed for this purpose. Blisters are seldom of use early in acute attacks; they are most useful towards the decline of the disease, and when the action of the several emunctories has been duly promoted. They are more beneficial in sub-acute cases, and when the joints are affected; but they should not be employed immediately over superficial joints, but only near to them. The repeated application of blisters is generally preferable to keeping them open.

145. (*h*) *Embrocations, liniments, and rubefacients* of various kinds have been employed, both empirically and with rational intentions, as aids in the cure of the several forms of rheumatism. They have been even resorted to as the only means, and often as popular remedies and without medical advice. Several nostrums are employed in the form of embrocation or liniment; and, although relief has often been procured by them, yet their inappropriate use, and the application of them while the morbid conditions of the nervous and vascular systems remained unabated, have been followed in some cases by dangerous and even fatal consequences—by internal complications, or by the super-vention of disease of internal surfaces or organs, with effusions or adhesions. A few instances of these results have come under my observation, and have demonstrated the danger of having recourse to means which may suppress the local manifestation of a constitutional evil, without having prescribed judicious internal remedies for that evil, and without having employed agents calculated to throw off or to resist the tendency to internal complications. It would be endless, and of doubtful advantage, to enumerate the various embrocations, liniments, and rubefacients which have been praised for the several forms of the complaint. Most of the *formulae* comprised under the head *Linimenta*, in the APPENDIX (*Form.* 295–314), may be used also as embrocations and rubefacients in this disease with great advantage, when a judicious internal treatment has preceded or accompanies the use of them. Under such circumstances, warm *rubefacient poultices* and *rubefacient plasters* will also be found of service, more especially in chronic cases.

146. (*i*) *Frictions, shampooing, percussion, and flagellation* have been much employed in the more chronic and obstinate states of the complaint; but these means, especially frictions and shampooing, are most serviceable after warm salt-water or medicated baths. The frictions may be only simple, as with the hand, or with sweet oil, or with variously prepared oils or liniments, or with the hard Indian glove, or with the hair-brush, or with any of the liniments prescribed in the APPENDIX. *Percussion* not infrequently relieves for a time the chronic pains of muscular or aponeurotic parts; and *flagellation* may have a similar effect; but it has been little used since the practice of medicine was rescued from the hands of monks in the

dark ages, although it was employed by the ancients.

147. (k) *Galvanism* and *electricity* have had numerous advocates in the chronic forms of rheumatism, and they are sometimes of service, especially *electro-magnetism*, in the more passive states of the chronic disease. Several recent writers have furnished evidence in favour of the use of magnetic electricity in these forms of the complaint; but I am unable to give an opinion respecting it from my own experience. I have, however, seen benefit derived in a few instances from galvanic electricity.

148. (l) *Insolation*, or exposure of parts affected with chronic rheumatism to the sun's rays, has been advised, and I have prescribed it with benefit in the passive or cold form of the complaint. The effect probably depends not merely upon the warmth thereby produced, but also upon the electrical agency of the sun's rays. Much of the benefit derived from migrating to a warm climate in cases of obstinate rheumatism arise from this cause; but the change should be made to a dry climate and a clear atmosphere; for if the situation abounds in humidity or malaria, however warm it may be, the rheumatism will still continue, or even be aggravated.

149. (m) *Issues* and *setons* have been mentioned favourably by some of the writers who have recommended the production of artificial eruptions for this complaint. They are rarely required, or submitted to, in cases of simple chronic rheumatism; but I have prescribed them with marked advantage in certain of the complications, or internal extensions of the disease, more especially during, or subsequent to, rheumatic endocarditis or pericarditis, or when the spinal membranes have become affected. They are also of use in sciatica, and when the large joints are implicated, and in these cases they have been recommended by BARDSLEY; but they should be prescribed in a suitable situation, so as to produce a derivation from the part or joint itself, and yet not be far removed from it. Two, or even three issues may be required in some cases.

150. (n) *Moxas* have been recommended, from the most remote times in the Far East, for chronic rheumatism, especially when seated in the joints; and they have been praised by THULENIUS, BESE, PASCAL, NAUDAU, and more recently by LARREY, DUNGLISON, and BOYLE. They are often of service when applied in the situations advised for issues, and when a puriform discharge from the parts cauterized by them is obtained. They, as well as issues and setons, are suitable to the more chronic cases, or, rather, to the effects of rheumatism than to recent attacks.

151. (o) *Mineral waters* and *mineral baths* are among the most beneficial and popular remedies for the several states of chronic rheumatism. Much of the benefit derived is, however, due to the change of climate, air, scene, and occupation consequent upon visiting watering places. The natural thermal springs have been most generally recommended for the more chronic and obstinate states of chronic rheumatism, and for sciatica, especially those of Bath and Buxton, in this country; of Wisbaden, Baden-Baden, Karlsbad, &c., in Germany; of Baresges, in France; and of several in

Italy. The chemical composition and temperature of these several springs will suggest the propriety of having recourse to them in the circumstances of each case; and it is chiefly with a strict reference of this composition to the peculiarities of individual cases, that a selection of both thermal springs and of other mineral waters should be made. Much information will, however, be obtained on this topic from the writings of FALCONER and BARLOW on the Bath waters; from those of ROBERTSON and SCUDAMORE on the waters of Buxton; from those of GRANVILLE, OSANN, LEE, and GAIRDNER on the German thermal springs; and from CARMICHAEL'S account of the water of Baresges and Bagnères de Bigorres. Not only may these waters be taken internally, but they are still more beneficial when used as general or local baths, or in the form of douche. The duration of these baths should depend upon the strength of the patient. It should be short at first, and prolonged with repetition; but benefit will seldom be derived until a number of baths have been taken. The circumstances of the case should, however, suggest both the duration and the frequency of them. The same remark applies to the use of the douche. Immediately after the bath or the douche, the surface should be rubbed with dry hot towels, and the patient wrapped up in flannel or in blankets, so as to promote, for several hours, a copious perspiration. The use of warm chalybeate baths in chronic states of the complaint was much insisted upon by BRANDIS; of the waters of Rehburg by ALBERS; of sulphureous waters and baths by many writers; and of numerous mineral springs by authorities of every kind, some of which will be found in the *Bibliography*.

[Much benefit has often been derived in this disease from the use of the sulphur waters of Virginia, or of Avon, Richfield, or Sharon, New York, in connexion with the pure country air, and the freedom from care and anxiety, and the agreeable society met with at these watering places. The *White Sulphur Springs* of Virginia are perhaps the most celebrated in the cure of rheumatism, although the same ingredients are substantially found in several others, as the Red and Salt, Sulphur, and the Avon Springs. That they are curative in this and other chronic diseases, independent of the other adjuncts above named, is fully established, and what we might *a priori* be led to believe, when we reflect that they are cathartic, diuretic, tonic, and alterative. They are to be used both internally and externally in this and other diseases in which they are indicated, and their employment be persevered in for a considerable period. The ioduretted and carbonated saline waters of Saratoga have also been found efficacious in relieving chronic forms of this disease, and are well worthy of a trial.]

152. (p) A form of *physical training* has lately come into vogue for chronic rheumatism and other chronic ailments, more especially such as result from dissipation, excesses, irregularities, &c., of various kinds; and this training, conjoined with change of air, occupation, scene, and mode of living, forming part of the system, and with bathing, the copious use of diluents and exercise, so as to produce a very free cutaneous discharge, is often productive of marked benefit, which is the more striking in those

obstinate cases, which have often become obstinate from the fault and neglect of the patient, and from recourse having been had to many physicians in succession without allowing any one of them time or opportunity to employ the salutary resources of science. What, however, is denied the honest advice of a physician, is readily accorded by the patient to the confident humbug of the charlatan, especially when it is sought for at a distance, and acquired at an expense which is felt as a recommendation, although the only one. Regular modes of living, active and regular exercise, temperance, and a copious use of diluents, a free excretion from the skin, procured by baths, diluents, and exercise, and change of air, of occupation, and of scene, have been recommended by physicians in all ages for many chronic complaints; but they have generally been imperfectly followed out, or partially adopted, or altogether neglected by those for whom they were prescribed. When, however, they were ushered to the public, sane and insane, as the results of inspiration; were surrounded by appliances calculated to excite the senses of the weak-minded, to attract the credulous, to allure the idle, the frivolous, and the intriguing, and to strike those whose consciousness reaches but little farther than their sensations, and who are incapable of observing and of reasoning on facts and occurrences; and when they were moulded into a plan, and popularized under the name of "*water-cure*," and were thus recommended by every means of publicity to that largest class of the community now specified as a universal remedy, beyond all remedies the most efficacious, then were the results such as might have been anticipated by the philosophic observer of human nature, and of the constitution of the human mind as influenced by existing states of society. The most remote of these results already appear in a more accurate estimation of this universal "*cure*," and in the recognition of the fact that, of all the "*vanities under the sun*," the greatest and the shortest lived are those by which charlatans gull the public, and jeopardize not only the lives of the credulous, the thoughtless, and the worthless, but also the most important interests of families.

[These very judicious remarks on hydropathy (*water disease*, correctly translated) will meet with a willing response from every reflecting and candid mind. If we abstract from this system of cure all the adventitious aids of change of air and scene, freedom from care, anxiety, and labour, a properly regulated diet, regular and abundant exercise, the gentle exhilaration of spirits caused by the bold promises of amendment or cure, and the cheerfulness produced by the agreeable society of the better classes of both sexes: if all these be abstracted, we fear there would be little for water-cure establishments to boast of, certainly nothing which could for a moment commend them to the notice of any rational being. The dishonesty of their proprietors and supporters consists in claiming in behalf of *water* what more justly belongs to other agencies. Indeed, we have often been led to believe, from personal observation, that greater and more frequent cures would be accomplished at these establishments if the water part of the treatment were entirely omitted, while the other influ-

ences remained the same. But this would be the tragedy of Hamlet, the part of Hamlet omitted by request. There would be no chance to glorify and deify *water* at the expense of the other good things of God. Othello's occupation would be gone, and men, who might have made useful mechanics and labourers, would have to go back to their original calling, the humbug being exploded, and their business at an end. From a personal examination of most of these institutions in the Northern States, we are fully satisfied that, notwithstanding cures are sometimes accomplished at them, yet that very great injury is often caused by the hap-hazard and indiscriminate use of cold water. We have seen patients reduced to great debility, and with feeble recuperative powers, subjected to the *douche* and the *plunge*, both with the effect of prostrating their strength still more, and in some cases with a speedily fatal result. We have nowhere found cold water used with that caution and discrimination which so powerful an agent requires; nowhere have we found any rational or scientific rules for its employment; a blind routinism prevailed in them all, and the results, of course, were such as might have been anticipated. All this the enlightened members of the profession well understand: the public would not believe it were an angel, trumpet-tongued, to proclaim it in the sky.]

153. (g) *Sulphur*, in the form of sulphur fumigation, the oil of sulphur of former times, and the *carburet of sulphur*, have been locally or externally employed for the more obstinate forms of this disease. Orto, of Copenhagen, recommends, either alone or in conjunction with vapour baths, two drachms of carburet of sulphur in half an ounce of rectified spirit of wine, four drops of which are to be taken internally every two or three hours, and the parts affected to be rubbed with a liniment consisting of two drachms of this carburet and half an ounce of olive oil. This treatment is most suitable to those cases in which the secretions and excretions have been duly improved and promoted by the appropriate means before it is entered upon.

154. (r) *Urtication*, or stinging, or flagellation with nettles, has been advised for chronic rheumatism, as well as for some forms of palsy, by many of the older writers, and it has in more recent times been prescribed by HUFELAND. It may be resorted to with advantage after warm or vapour baths, or in similar circumstances to those in which other rubefacients and external derivatives have been recommended, as warm terebinthinate embrocations, &c.

155. VI. TREATMENT OF THE COMPLICATIONS OF RHEUMATISM.—A. It has been stated above that acute rheumatism may extend to the *membranes of the brain*, the disease either continuing in its more external seats, or subsiding in, or disappearing from these (see § 50 and 51). When head symptoms occur in the course of acute or sub-acute rheumatism, the chief object is first to ascertain the cause and nature of this complication; to determine in how far it may be caused by the treatment; and to observe the evidence for or against the existence of inflammatory action in the membranes, or of simple nervous disturbance, or of a combination of both. Delirium, if slight, wandering, and nocturnal, the external disease continuing but lit-

tle or not at all ameliorated, may arise from the narcotics prescribed, or from too lowering or depressing agents, or from the exacerbation of the fever (see § 50), and in these circumstances the indications are obvious. Violent or distracting pain in the head may also depend on the same causes, and be removed by similar means to those which these indications suggest, or by such as are prescribed for this form of headache at another place. (*See art. HEADACHE, § 50, et seq.*) But when the head affection appears to be dependent chiefly upon inflammatory action in the membranes, then the subsidence of the external disease, especially that of the joint, will indicate its nature and the danger of effusion. In these circumstances, while active revulsion or derivation should be attempted by sinapisms applied to the parts affected previously, local depletions should be ordered, and be followed by blisters on the nape of the neck and occiput, or behind the ears. Calomel and antimony, purgatives and terebinthinate enemata ought also to be administered; and if somnolency, or sopor, or coma be threatened, the head should be shaved and surrounded by a cloth which has been just soaked in spirit of turpentine, or which is imbued with an embrocation consisting of equal parts of the terebinthinate and compound camphor liniments.

156. *B. The complications with the several forms of cardiac and pericardiac inflammations and their consequences* are the most frequently met with in practice (§ 48 and 49). The nature and treatment of these complications have been so fully discussed when treating of diseases of the heart, that I have left nothing to add respecting them at this place. I may, however, remark that further experience has proved the accuracy of the opinions I then stated, and the propriety of employing the means of cure there advised. Rheumatic endocarditis and pericarditis, so common in children and young subjects, especially in cold, humid, and variable climates, depend chiefly upon the fashions in clothing; upon low, damp, and ill-ventilated places of abode; upon modes of living; and more especially upon the unnatural practice of hardening children by exposure and by fashions in dress. Hence the necessity of avoiding these causes, and of pursuing a treatment calculated to diminish or remove morbid effusion or change of structure, and at the same time to improve the constitution of the blood, and to promote vital action and constitutional powers—objects which may be attained when these complications occur in young subjects, although they may be only partially or contingently accomplished in older subjects. (*See Treatment of Rheumatic Endocarditis and Pericarditis, in art. HEART and PERICARDIUM, § 144, et seq.*)

157. It is not unusual to meet with cases in which this complication has occurred in early life, or has appeared at some previous period, the acute rheumatic attack having been entirely removed, but the cardiac or pericardiac affection continuing either with or without detection. In some cases which have come under my observation, for very many years after the rheumatic fever, complicated as now stated, had occurred, and even after every rheumatic symptom had disappeared, little or no ailment had been experienced, until shortness of breath

on exertion, or dropsical effusion evinced the mischief produced in the heart. In other cases, however, attacks of acute, or sub-acute, or chronic rheumatism, have followed at periods more or less remote from that attack in which this complication first appeared, generally aggravating the cardiac or pericardiac lesion, but not having always this effect; for I have met with instances, one of them in a medical man, in which an attack even of acute rheumatism has not increased the organic disease of the heart which had taken place during a previous seizure.

158. A reference to the histories of cases of this complication, which have come under my care in the course of a practice of thirty years, and of which I have preserved notes, suggests their classification as follows: 1st. Cases in which rheumatic fever complicated with cardiac disease had been experienced in early life, but many years had passed without any ailment having been experienced, until shortness of breathing on exertion and dropsy ultimately supervened, the patient dying of the cardiac disease, no second attack of rheumatism having occurred. In a case now under my care, twenty-three years elapsed between the rheumatic fever thus complicated and the present developed state of the organic disease of the heart, no rheumatic disease or other ailment having been experienced during all these years, although the cardiac affection had been slowly progressing until it has reached its present state. 2d. Some years after the occurrence of this complication, the cardiac disease still existing, latent or detected, another attack of acute rheumatism has supervened, and has aggravated the cardiac complication, or even diminished the physical signs and symptoms of this complication, these different effects depending much upon the treatment and constitution of the patient. I have thus seen two attacks of rheumatic fever take place after intervals of years, the cardiac complication at last destroying the patient. In the case of a medical man, two such attacks, after intervals of some years, have left the cardiac disease, in respect of both the physical signs and the symptoms, much less extensive and severe than when I first saw him, fifteen years ago. 3d. Much more frequently the patient who has experienced an attack of cardiac disease in the course of, or consequent upon, rheumatic fever, has suffered recurrences of the rheumatic affection in a slight or chronic form, without any very manifest aggravation of the cardiac disease, which, however, has either slowly advanced, or has proceeded more or less rapidly according to his habits, modes of living, constitution, and treatment. 4th. In several instances rheumatic fever has occurred in early life, accompanied or followed by a cardiac complication, and no second attack of rheumatism has appeared, or merely slight or chronic rheumatic affection; but the cardiac symptoms, as well as the physical signs of cardiac disease, have gradually subsided, until they have, after several years, nearly altogether disappeared, or have been attended by little inconvenience.

159. It is obvious that, in these several states of complication, the exact nature, and extent, and consequences of the cardiac and pericardiac lesions, demand the chief attention, and that the

treatment of whatever rheumatic affection may be present should be a secondary object. Fortunately, however, the very means in which I have for many years confided for the several forms of rheumatism, are also such as are most serviceable in the cardiac lesions most commonly associated with them. After what I have stated, when treating of diseases of the HEART and PERICARDIUM (see § 144, *et seq.*), I need only enumerate some of the most efficient means which may be prescribed in these complications, and which moderate powers of observation will enable the physician to apply to the peculiarities of particular cases. Upon the approach, or in the early stage of the cardiac complication, *calomel* with *opium*, or with *aconite*; or the tincture or extract of *aconite* with *biborate of soda* or with *alkalies*; spirits of *turpentine* given by the mouth; *alkaline aperients* with *colchicum*; *camphor* with *digitalis* and *henbane*; the *alkalies* in large doses with demulcents and diluents, and external revulsion, are most efficacious in preventing the deposition of lymph or fibrine, and the effusion of fluid. At an advanced stage, when either fibrinous lymph or serous fluid has been effused, or when hypertrophy has followed obstructive or other changes of the valves and orifices of the heart, then the *iodides* of mercury or potash; *borax* in camphor mixture; the *iodide of potassium*, and the solution or carbonate of *potash*, with the compound decoction of *sarza*, or the decoction of *senega* and an aromatic water; *camphor* with *digitalis*, and with either of these decoctions, or with the infusion or tincture of *hops*; the *iodide of iron* in the sirup of *sarza*; and an issue or seton near the margin of the ribs, are the means in which I have most confided.

160. C. When the membranes of the spinal chord are affected (§ 52, 53), the treatment should depend much upon the duration of the disease in this situation. If the patient be seen early, local depletion, chiefly by cupping, followed by *calomel* and *opium* with *colchicum*; by purgatives and terebinthinate enemata; by terebinthinate embrocations in the course of the spine, and by blisters, are most serviceable. If the case come under treatment at a more advanced period, or if the above means have failed, partial palsy or paraplegia, or other symptoms of increasing congestion, effusion of lymph or pressure on the chord appearing, issues or setons in the back or loins, the bichloride of mercury, or the iodide of potassium in the decoction of *sarza*, and the other means advised in the articles on PALSIED AND SPINAL CHORD, will then be appropriate.

161. D. When the diaphragm, or either its pleural or peritoneal surfaces are implicated, or when the costal *pleura*, or the *peritoneum* (§ 54, 55, 56) reflected over the abdominal parietes, is attacked, the lymph thrown out soon excites inflammatory action in the opposite parts of these membranes, and agglutination of the surfaces soon follows. This complication not infrequently came under my notice many years ago in public institutions, the affection of these surfaces having been an extension of disease from the adjoining parts the tenderness and pain of which often masked the more internal mischief. When, however, the diaphragm is implicated, the symptoms of diaphragmitis are generally present in a very manifest form (*see*

art. DIAPHRAGM, § 9, *et seq.*). In these associations of the disease, the means already advised, especially local depletions, *calomel*, *colchicum*, and *opium*; terebinthinate embrocations, blisters, issues, &c., and various other means recommended in the articles on inflammations of these surfaces and on their consequences, may be resorted to. In many instances these forms of disease are not brought before the physician until they have arrived at advanced or chronic states; until effusion, adhesion, &c., have taken place; and then a judicious and persevering treatment will be required to produce any amelioration, aided by change of air, by suitable diet, and by whatever may promote the general health and constitutional power. In many cases, however, the iodides already mentioned, taken in suitable vehicles; bichloride of mercury in small doses with *sarza*; alkaline solutions with iodides; PLUMMER'S pill with soap and taraxacum; repeated applications of the terebinthinate embrocation; repeated blisters and issues, when aided by proper regimen, will be productive of some benefit. These external means are more efficacious than the application of the tartar-emetic ointment, which I have not found of much service in these cases.

162. E. The association of affections of the sexual organs with rheumatism, or the superposition of the former upon the latter (§ 57), requires means adapted to the states of sexual disorder, such disorders being duly considered under their respective heads. But, in respect of these, as of other associations of internal disease with rheumatism, it should not be overlooked that it is not only such internal disease which requires appropriate treatment, but also the rheumatic diathesis—the constitutional affection, whether depending upon or seated in the organic nervous system, or in the blood, or in both—and to this diathesis, and to the conditions constituting and indicating it, our means of cure should also be directed; using means calculated to support the vital power of this system, and to remove the morbid conditions of the blood—objects which are more certainly attained by the remedies I have advised for the treatment of rheumatism than by any other. Rheumatism in females being so frequently connected with suppression, or irregularity, or difficulty, or the cessation of the catamenia, or with leucorrhœal affections, due attention in the treatment should therefore be devoted to these disorders.

163. F. Gonorrhœal Rheumatism, or the states of rheumatism consequent upon gonorrhœa (§ 44, *et seq.*), is one of the most difficult to remove. A severe case of it occurred in my practice very lately, and presented the mixed form of capsular and aponeurotic rheumatism, the knees and limbs generally having been severely affected. The iodide of potassium and solution of potash, in the decoction of bark, or in the guaiacum mixture, and frequently with *colchicum*, were the medicines chiefly prescribed. The case proceeded favourably, and after a few weeks the patient was able to have change of air, and to take regular walking exercise. In more obstinate cases, I have given the spirit of turpentine internally until the urinary organs were affected with success; or bark with alkalies and the iodide of potassium, while terebinthinate epithems, or blisters, were

applied on or near to the affected joints. In this form of the disease, a full dose of calomel, colchicum, and opium, taken at night, and a draught with castor oil and spirit of turpentine the following morning, in addition to these means, and repeated at intervals of one, two, or three days, will generally be of great service. I have seen the *tinctura lyttæ* and capsicum given with the medicines now mentioned until some degree of irritation was produced in the urinary organs by the former, and until heat or smarting at the anus followed the latter, prove most beneficial in this form of the complaint. If the affection of the joints become chronic, the internal use of the iodides, and the repeated application of blisters, or the formation of issues near the joints, and recourse to thermal springs, are among the most efficacious means of cure. If this form of the disease be neglected at an early stage and becomes chronic, it is not only removed with the greatest difficulty, but organic lesion of the joint is very apt to supervene.

164. *G. Rheumatism is often associated with influenza or catarrhal fever, or with ague, or with a remittent form of fever*, and I have already shown that the complication is due chiefly to the presence of malaria in the humid and cold air to which the patient has been exposed, or to his having previously been the subject of ague (§ 58). In cases of either of these associations the treatment which I have recommended for the rheumatic affection is equally appropriate to the associated disorder, the lowering means too frequently prescribed for the former aggravating not only it, but also the complication, and favouring the supervention of still more serious internal disease, especially of the fibrous or serous surfaces.

165. *H. If Pneumonia or pleuro-pneumonia supervene in the course of acute rheumatism, a moderate general or local vascular depletion will be prescribed with advantage, if the patient be strong or plethoric; and calomel or antimonials with opium, and saline diaphoretics, will generally be required. Blisters will also be of service.* In a case which was under my care, caused by removal in an unfavourable state of weather and season into a damp house, rheumatism, in a sub-acute form, disappeared from the arm after two doses of the wine of colchicum, of ten drops each, had been taken, and was immediately followed by asthenic pneumonia with rusty expectoration. A small cupping on the chest (seven ounces), and camphor with ammonia, small doses of the decoction of senega and terebinthinate rubefacients, and due attention to the several secretions and excretions, especially to those from the skin and kidneys, were soon followed by recovery. Pneumonia and pleuro-pneumonia associated with, or consequent upon rheumatism, have but rarely come under my observation; and the association of *scurvy* with rheumatism is not more frequent, although these complications appear to have been of more common occurrence during the early part of the last century, according to the best practical writers on medicine in that period. More recently, *lemon-juice*, which has been found so beneficial for the prevention and cure of scurvy, has been said to have been serviceable in rheumatism, but I have had no experience of it in this latter complaint.

[There is a rheumatic affection not infrequently met with, which may be termed *hepatic*, in which we find pains in the back, shoulders, breast, and superior extremities, and even of the larger joints, as mentioned by Sir W. PHILIP. Dr. JAMES FOUNTAIN, a distinguished practitioner of West Chester county, New York, called attention to this complication in an article on "Diseases of Irritation," published in the New York Medical and Physical Journal in 1826. Dr. FOUNTAIN describes these pains as the effect of nervous irritations, symptomatic of the internal hepatic affection, and states that he has known people labouring under slight hepatic derangements, who for years have seldom been free from these pains wandering from one joint to another. "Some," he remarks, "enjoy a degree of health, while others are feverish. Like sub-acute hepatitis, these pseudo-rheumatic pains may exist an indefinite length of time without inducing organic derangement. But where, from any cause, they become aggravated, a real inflammation is developed, and from an effect they become a cause. Instead of an irritative symptomatic, we have now an inflammatory affection to encounter, frequently involving in the excitement the whole vascular system, producing a symptomatic fever. The former pains are supplanted, and a new feature is given to the primary disorder of the joints; and on the principle of counter-irritation the original hepatic disease is sometimes wholly removed. Now it must be evident that this complication, from beginning to end, must be totally different from ordinary rheumatism from cold. This form is quite common; and the ill success of the means ordinarily employed has contributed not a little to strengthen the prejudices of people against the use of medicines in that disease." Dr. FOUNTAIN divides the means of cure in hepatic rheumatism into two classes, those required during the irritative, and those during the inflammatory stage. During the irritative stage, the indication is, of course, to remove the exciting cause—the hepatic derangement. For this purpose he recommends mercurials and laxative medicines. Four or five grains of blue pill, with the same quantity of rhubarb, should be administered twice every day, and as much sulphur, magnesia, and senna as will open the bowels fully, is to be given every second morning. After using these remedies for a week or ten days, an infusion of quassia or colombo may be taken every morning, using at the same time some moderately stimulating embrocation to the painful parts. During the second or inflammatory stage we have hepatic derangement, universal debility, and local inflammation to encounter. Moderate venesection is here recommended by Dr. FOUNTAIN, for he thinks that rigorous depletory measures are unsafe, in which opinion we agree with him. The bleeding is to be aided by the administration of ten or twelve grains of a powder consisting of one part of calomel, two of antimonial powder, and four of nitrate of potash, every three hours from mid-day till nine in the evening, followed next morning by an operative dose of sulphate of magnesia and infusion of senna. Dr. MOORE, in his New York Hospital Report, has noticed the same hepatic complication, and derived much benefit from the cathartic plan. The whole body, and the

oints especially, are to be carefully enveloped in flannel.

The *Phosphate of Ammonia* is strongly recommended in rheumatism by Dr. T. H. BUCKLER, of Baltimore, under the belief that it tends to eliminate uric acid from the blood, by forming with it a soluble urate of ammonia, the phosphoric acid being neutralized by the soda with which the uric acid may be combined in the blood. Dose ten to twenty grains, from three to six times in twenty-four hours, in all forms of rheumatism. (*American Journ. of Med. Science*, N. S., vol. xi., p. 108.) Dr. RUSCHENBERGER, of the United States Navy, has derived much benefit in this disease from *cold water dressings* to the joints, and the use of from three to six grains of opium at night, with an equal quantity of sulph. quinine. (*American Journal of Medical Science*, N. S., vol. xiv., p. 263.) Professor WOOD, of Philadelphia (*A Treatise on the Practice of Medicine*, 2d ed., vol. i., p. 435), speaks favourably of bleeding once or twice in acute rheumatism, followed by active purging with salts, jalap, and bit. potassa, calomel, or colchicum and magnesia, with refrigerant diaphoretics, as a combination of tartar emetic and nitre, from one twelfth to one sixth of a grain of the former and five to ten grains of the latter in water, at intervals of one, two, or three hours; or nitrate of potash in the form of an effervescing mixture, and the occasional use of the warm bath. Pain is to be alleviated and sleep procured by full doses of DOVER'S powder at night. If the powder be rather feeble, pulverized guaiacum, in doses of ten to twenty grains, is to be combined with the DOVER'S powder. Should the disease not yield to these measures in ten days or two weeks, then calomel is recommended, with a view to its alterative influence, but not previous to a decided reduction of the general excitement. It is seldom necessary to carry it to the point of salivation. At this period, also, Professor WOOD thinks the colchicum most beneficial with one of the salts of morphia, and it may be given before or in aid of the mercurial. If an adynamic condition of the system supervene, then the sulphate of quinia, in doses of one grain every hour, is strongly recommended as highly beneficial. If the heart or brain become seriously involved, venesection is to be carried as far as it can be borne with leeches or cups, succeeded by a large blister, while calomel is pushed to speedy salivation, and attempts are made, by sinapisms, &c., to invite the disease back to its original seats. In chronic rheumatism, Professor WOOD recommends mercurial alteratives as by far the most successful remedies, often carried so far as to induce ptyalism. The attention of the profession in this country was first strongly called to this mode of treatment by the late Dr. ORTO, of Philadelphia (see *Eclectic Repertory*, vol. ix., p. 528). Dr. CHAPMAN speaks strongly of *savine* as a remedy in chronic rheumatism; others have found great benefit from *cimicifuga*, *phytolacca*, and the *zanthoxylum* or prickly ash. That a course of hydropathic treatment often breaks up the disease no one will deny, although it is not unattended with danger. In one instance we knew it bring on universal and severe inflammation in all the joints of the body, attended with long-protracted confinement to bed, and total inability of motion for several

months, from which the patient has not yet entirely recovered, nor does he enjoy as much exemption from suffering as before subjection to the water cure. Such cases are by no means of rare occurrence, while in other instances great benefit has resulted from this powerful alterative treatment.]

166. vii. REGIMEN, DIET, AND CHANGE OF AIR.—There are few diseases which require greater attention to these than rheumatism. During an attack of the acute form of the disease, the regimen and diet should be antiphlogistic. Such articles as are the least likely to occasion acidity should alone be taken. Saccharine substances ought to be avoided. As soon as convalescence has proceeded sufficiently far to admit of removal, change of air should be recommended, more particularly to a warm and dry air, or to a place where warm salt-water baths may be procured, or thermal springs may be used, especially to Bath or Buxton. If the attack has not been complicated with, or followed by, any affection of the heart, regular and active exercise in the open air ought to be taken as soon as the patient is able, so as to preserve a free excretion from the skin. If any cardiac affection is present, an issue should be kept freely discharging near the margins of the ribs. In more chronic or mild cases, the regimen and diet ought to be regulated according to the peculiarities of individual cases; but, in every instance, change of air, active exercise in the open air, when it can be taken without detriment to the affected part, flannel clothing nearest to the skin, a diet regulated conformably with the state of the complaint, and due regulation and promotion of the several secretions and excretions, are most important aids to a permanent recovery, and to the prevention of a future attack.

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RICKETS. —SYNON.—*Rhachitis* (from *ῥαχις*, the spine, or *παχις*, spinal), Glisson. *Rachitis*, Sauvages, Vogel, Boerhaave, Cullen. *Tabes Pituitosa*, *Morbus Anglicus*, *Osteomalacia*, *Mollities ossium*, *Osteosarcosis*, Auct. *Innutritio ossium*, Darwin. *Osteomalakia*, Swediaur. *Scrofula rachitidis*, Young. *Cyrtosis rachia*, Good. *Tabes pectora*, *Spina nodosa*, *Rachitismus*; *Rachite*, *Rachitisme*, *Riquets*, Fr. *Englische krankheit*, Germ. *Rachitide*, Ital. *Rickets*, softening of the bones.

CLASSIF.—Class 3d. Cachectic diseases; Order 2d. Swellings (Cullen).—Class 5th. Diseases of the Excrement Function.—Order 1st. Affecting the Parenchyma (Good). IV. CLASS, IV. ORDER (Author).

1. DEFIN.—Softening and curvature especially of the long bones, and swelling of their extremities; the head being large, the spine bent, the abdomen enlarged, the flesh emaciated and flabby, with all the signs of general debility and impaired assimilation.

2. This disease was first described by Dr. DAVID WHISTLER, in his inaugural dissertation (*De Morbo Puerili Anglorum dicto "the Rickets."* Lugdun. Batav., 1645.) Glisson, who soon afterward wrote on this complaint, states that he was induced to give it the name of *Rhachitis*, because the spine was so often affected in its course, and because the term nearly resembled *rickets*, the name by which it was commonly known in England before the time at which he wrote. Dr. CUMMIN remarks that the works of WHISTLER, GLISSON, BATE, and others procured a currency for their opinion that the disease made its first appearance in the western parts of England towards the middle of the seventeenth century, and that it hence was called the *English malady*. The first of these writers published in 1645; the second edition of GLIS-

son's treatise appeared in 1650; and hence it may be inferred that the complaint at first appeared at a much earlier period. FLOYER, indeed, states that "*Rickets* first appeared in England about the year 1620." These, as well as other contemporary writers, contend that the disease was considered of recent date; that it first appeared in the southern and western parts of the island, and that it had spread to the eastern and northern counties by the time when GLISSON wrote.* Softening of the bones, although most frequently observed in the young of the human species, is not confined to the species; for it has been observed in monkeys, in the several domestic animals, in the ox, the horse, and in pigs; and even in poultry, especially when exposed to cold, humidity, unwholesome air, and to improper diet. [It has also been observed in the bear, the dog, calves, lambs, the cat, rat, mule, lion, and the porcupine.] Viewing rickets as consisting chiefly of an imperfect assimilation, in which the bones suffer more especially, and evince more or less softening, I shall first and chiefly consider it as it appears in *children*, as common or true rickets; and *next*, very briefly as it occurs in *adults*, or as the *mollities ossium* of writers.

3. I. RICKETS AS AFFECTING INFANTS AND CHILDREN.—Rickets have been observed in the fetus by several writers; but it is doubtful whether or not the imperfect ossification, and consequently softened state of the bones, observed congenitally, should be viewed as rickets, as in this disease there is, as will be shown hereafter, a change in the state of the affected bones different from a mere delay or simple imperfection of osseous formation. The complaint has been met with from the earliest months until approaching puberty; but it is most commonly observed to commence during the first dentition, or from six or seven months to three years of age. M. GUÉRIN states that, of 346 cases, 209 were affected from the age of one to three years. Three cases only were congenital, and 34 only occurred from four to twelve years. Of the 346 cases, 148 were males, and 198 females.

4. i. DESCRIPTION.—The course of the disease has been divided by MM. GUÉRIN and GUERSENT into *three stages*, 1st, that of incubation; 2d, that of deformity; and 3d, that of restoration or of irremediable atrophy, as the termination may be. From considerable experience of the complaint, I believe the division to be useful, and to be based on sound observation.—A. The *precursory or incubative* period does not constitute the complaint; but consists chiefly of that impaired state of the organic nervous or vital functions which occasions those changes constituting the malady; and that state

* [There is no proof whatever that this disease originated in England, or that it is a new complaint. The kinds of deformity which it produces are described by both Grecian and Roman authors as existing in ancient times. It was not until the seventeenth century that the disease was distinguished by any particular name from other affections which occasioned deformity of the limbs: there is no doubt whatever that it has existed in all ages, especially in cold, variable, and humid climates, like that of Great Britain. We have records of its very extensive prevalence in England long before the period mentioned by Dr. CORLAND, and also of the great mortality which it occasioned. We know that some of the English medical historians represent it as having originated in Dorsetshire and Somersetshire, and from these counties to have spread over the world; but there is no foundation for such a belief.]

may be associated with a variety of ailments of the digestive and assimilating organs. The transition from apparent health to the incipient state of the disease is always gradual, and consequently more or less slow; but it may be masked by some other disorder, and hence not be recognised until this period has made considerable progress. The impairment of vital power originating the malady is most frequently associated with indigestion, or with chronic irritation of the gastro-intestinal mucous surface, or with bronchitis, or with whooping-cough, or even with lobular pneumonia, and with more or less change of the urine, which, however, has generally been imperfectly examined. Nevertheless, cases occur in which but little or no ailment, or merely slight debility of the digestive and assimilating functions, has been remarked up to the time of the manifest appearance of the complaint.

5. With the approach of rickets, the child is dull, or sad, or peevish; is averse from play or any action; prefers to sit or lie, appears feeble or indolent, or complains of inability to use exertion, and of pains in the joints and along the bones; the appetite is impaired or is capricious; the bowels are irregular or relaxed, and the stools morbid, or pale, or deficient in healthy bile; the face is pale, and the flesh becomes soft and flabby; perspiration is free on slight exertion, and is weakening and colliquative during sleep, and the skin often moist during the day. The pulse is quick, soft, and broad or open, the external veins are large, and the jugular veins much dilated. Thirst is generally present; emaciation becomes evident, and the abdomen tumid. With all these symptoms, however, no evidence of rickets may exist; for they may accompany or usher in other maladies; but when with these the urine is more abundant than in health, and when it deposits a copious calcareous sediment, or abounds in the phosphates, then the early or precursory stage of the complaint may be considered as already present; and it is in this stage especially that the salts are most abundant in the urine (§ 16).

6. The *duration* of this period necessarily varies with the number and severity of the symptoms now enumerated, with the age and constitution of the patient, and more particularly with the quantity of phosphates contained in the urine. It may thus vary from one or two months to six or seven; but when the head is very large, and the bones of the head imperfectly developed, or the sutures not closed, when the abdomen is very tumid, the bowels lax, the stools pale and deficient in bile, and the urine abundant, the second or developed state of the complaint appears early. The continued operation of the causes, neglect or injudicious treatment, and the occurrence of some local intercurrent affection, may shorten this period; while a proper treatment and regimen may remove all the symptoms, and prevent the development of the disease. In some cases, also, the precursory stage may be hardly apparent, the first indication of the complaint being the actual deformity of the limbs constituting the second stage; the child may have appeared, up to the detection of the flexure of the long bones, in good health; although closer observation and an examination of the urine would have detected more or less evidence of disorder.

7. *B.* The *second period* is that which is characterized by more or less deformity of the bones. The extremities of the long bones, especially those of the ankles and wrists, and the sternal ends of the ribs, are the parts which first evince this stage, by their swollen or knobby appearance; and the lower portions of these bones now begin to yield, especially those of the lower limbs, when the child is so old as to attempt to walk. The increasing softness and yielding of the bones are now apparent in the gradual change of their forms. The lower extremities are usually curved by the weight of the body, while their bones yield more or less to the action of the most powerful of the muscles. They generally present the convexity of the curvature outward, and the concavity inward. The femurs are sometimes curved forward, but more frequently outward, as are the tibiae. The knees are sometimes bent inward, and the feet thrown outward, so that the knees press against each other, and the patient rests on the inside of the foot; and as often the knees are separated to an unnatural distance by the continued curvature outward of both the thighs and legs, the whole of the lower extremities forming irregular curvatures, with the convexities outward and greatest at or near the knees. In some cases the angle formed between the neck and shaft of the femur is changed from an obtuse to a right or an acute angle. Much of the deformity which takes place in this stage is owing either to the manner of carrying or placing the child, or to the weight of the body and head upon the lower extremities when attempts are made to stand or walk, and upon the upper extremities also, when the child crawls about on its knees and hands.

8. The head of the rickety child is generally unusually large. The vertex is often flattened; the forehead is prominent and broad; and the centres of the parietal bones expanded. The fontanelle is wide and unclosed; and, if the child be very young, the sutures expand or remain open. The bones of the face are imperfectly developed, or are partially arrested in their growth; and the under-jaw is often elongated. The process of dentition is arrested or delayed; or, if they have been formed, they soon decay, owing to softening of the fangs, and of the alveolar processes. The clavicles are, after the bones of the lower extremities, the most frequently deformed. The long bones of the upper extremities are much less frequently curved than those of the lower. The spine is generally also curved, owing as much to yielding of the ligaments as to softening of the bodies of the vertebræ. The curvature is commonly outward, but it is sometimes also lateral-outward in the back or between the shoulders, where the curvature is also to one side, and to the opposite side in the lumbar region, where also there is sometimes a curvature inward. The curvatures of the spine, especially outward, are generally connected with a flattening of the ribs laterally. The ribs are turned inward, and their sternal extremities, at their connections with their cartilages, are swollen into knobs. While the sides of the chest are thus compressed, the dorsal spine is pushed outward, and the sternum also outward, the diameter of the chest, from right to left, being thus much diminished, and the "pigeon breast" formed. (*See art.*

CHEST, Deformities of.) The flat bones, as those of the shoulder and pelvis, are also sometimes affected. The shoulder-blade is, in a few instances, so deformed as to embarrass more or less the movements of the shoulder; but when the bones of the pelvis are softened, the deformity is of the utmost importance, especially to the female, in after life. The change of form in the pelvis is often remarkable, and is extremely various, the sacrum and pubis being carried either backward or forward, the ilia directed inward or otherwise altered, the lower part of the sacrum pushed upward, and the outlet of the pelvis variously altered in form and diminished in diameter. The progress of deformity is generally from the extremities to the center of the frame, and more especially from below upward, particularly after the first year.

9. The relative proportion of the alteration of the different bones in rickety patients has been stated by M. GUÉRIN. But it should not be overlooked that, as the bones nearest the centre of the frame are the last affected, or are liable to deformity only at an advanced stage, and in neglected or ill-treated cases, the statistics he has furnished are open to the objections which may be urged against the statistics of other diseases; whether the relative proportion, or numerical calculations, be applied to symptoms, or to organic changes, or to remedial results; objections based on the differences of disease owing to varying combinations of predisposing and exciting causes; to endemic and epidemic influences; to seasons and weather, to modes and manners of life, and to numerous circumstances, to which it is needless here to advert. M. GUÉRIN states that, of 496 cases of rickets, 11 only had swellings of the extremities of the bones without curvature; and of the 485 with curvatures, 59 had at the same time deformity of the thorax, 48 deformity of the spine, 17 enlargement at the same time of the cranium, and 14 only deformity of the upper extremities simultaneously with these alterations.

10. During this stage, the deformity of the bones is not the only change. The alterations mentioned in connexion with the first stage continue during this. The abdomen continues tumid, or increases in size, and is more tympanitic, the limbs more emaciated and flabby; the child more languid and weak; the perspiration free and readily increased; the thirst increased; the pulse quick, small, and weak, with slight hectic symptoms; and pains are complained of in the bones and joints. The bowels are irregular, or loose, and the stools pale or almost devoid of healthy bile. The general emaciation and change in the bones allow the head to appear larger than usual, while it is often only large in proportion to the rest of the body; and while all other parts of the frame, the bones especially, cease to grow, during this stage, the head appears even to enlarge, and the faculties of the brain to be developed, sometimes precociously.* The cessation of growth, particularly

of the bones, during this period, is most remarkable in the lower extremities, and less so from below upward. M. GUÉRIN states, that his comparisons of the skeletons of rickety subjects with those of the same age and sex who had not been rickety gave the following per centage of reduction in the different bones: in the fibula, 26 per cent.; in the tibia, 25; in the femur, 22; in the cubitus, 19; in the humerus, 15; in the clavicle, 9; in the sternum, 8; in the spine, 5; and in the pelvis, 17 per cent.

11. The duration of this stage necessarily varies with the persistence or removal of the causes during treatment, with an early or delayed recourse to judicious means, with the diet and regimen, and with the local affections which may complicate the disease. In the more rapid states of the complaint this stage may not continue longer than two or three months, while in more chronic forms, and when the complaint has been long neglected, and unfavourable circumstances continue their influences, this period may extend even to several years, the deformity and its attendant symptoms either very slowly increasing or remaining nearly stationary.

12. *C. The third stage, or period of restoration,* or that attended by either a favourable or unfavourable change, is marked by no very sudden alteration from the state above described; it appears gradually, but rarely rapidly, unless some intercurrent disease or local affection supervene; and this is not infrequent.—(a) If the disease does not tend towards recovery, the emaciation increases, the abdomen is more distended, and the bowels more disordered, while the secretions and excretions are still more morbid than before. The deformity of the bones continue or increase; and ultimately the child is carried off by disease of the lungs or of the abdominal viscera, or several lesions of the thoracic and abdominal organs may coexist in the same case and terminate life, as congestion of the lungs with effusion into the pleura; general bronchitis with gastro-intestinal irritation; lesions in the digestive canals with enlargement of the mesenteric glands; crude tubercular formations in the lungs, with tubercles in the membranes of the brain, and effusion in the ventricles or between the membranes, &c. If the child is not carried off by one or more of these, and continues deformed, without any amendment of the symptoms, the softness of the bones is much diminished, their flexibility is lost, they are more atrophied, and they are more readily broken; the deformity often still increasing. Recovery then rarely takes place; a complication of internal disorders, consequent upon structural changes, and upon a morbid state of the blood, ultimately terminating life.

13. (b) *A favourable change from the second stage is evinced at first by the states of the secretions and excretions. The urine assumes a more natural appearance and composition (§ 16); the stools are more healthy, and coloured*

* Mental precocity is not, however, always seen; for sometimes the child continues dull, taciturn, or stupid, or even idiotic. These opposite states have been explained by supposing that the openness of the sutures has allowed the circulation and development of the brain to advance at an increased rate, and the faculties of the mind to expand; while the closure of the sutures, and the consequent unyielding state of the cranial bones, have confined and embarrassed the functions of the brain, and occu-

sioned the opposite state of the mental powers. But, as far as I have observed, precocity has not always existed in connexion with openness of the sutures, nor stupidity with their closure. Perhaps the chemical pathologists, who attempt to explain all by chemical changes, will account for the different phenomena by ascribing them to the state of the blood and to the excess of phosphates in it, during their passage from the bones to the kidneys, by which they are eliminated.

more deeply by bile; the abdomen appears less tumid and less tympanitic; the pulse is less frequent, and pains in the limbs are not so much complained of. The countenance presents more animation, and the hectic or remittent febrile symptoms and thirst subside gradually. The appetite is less capricious and more natural; and, with the continuance of these changes, the flesh becomes firmer, and voluntary motion is made with greater activity. The growth of the limbs, which had been suspended until now, proceeds with remarkable vigour; the bones are gradually restored, and, if the deformity is not very great, it disappears by degrees; the curvatures are either diminished or altogether removed; the swellings of the epiphyses of the bones subside, and ossification proceeds with great rapidity, the affected bones acquiring greater density and strength than usual. The muscles also acquire a more powerful development, so that persons who have been rickety in childhood have afterward become remarkable for strength.

14. (c) During *recovery* an excessive ossific action often occurs, more especially in the parts which had been swollen and softened during the stage of deformity. Not only are the sound bones more dense, but, in some instances, a state of hyperostosis or extoses more or less numerous, especially near the epiphyses and sutures, is observed. I have seen this occur most remarkably at the terminations of the ribs and commencement of the cartilages, the whole being more or less soldered together, and also with the sternum. Occasionally slight accessions of fever are observed during recovery, and either advance the process of restoration, or are the mere concomitants of the change taking place in the bones and system generally. If the complaint occur in children about the second year of age, or later, although it may be of considerable duration, amendment is generally rapid when it commences; and even when the growth is stunted, and the deformity is still considerable, still the period of puberty may remarkably develop growth and diminish the deformity, especially when the advantages of a favourable change of air and out-door exercise are enjoyed.

15. When the disease is attended by an outward or lateral curvature of the *spine*, or with flattening of the ribs and protuberance of the sternum (*see art. Chest, Deformities of*), recovery is imperfect and protracted, and the more so the greater the deformity arising from the curvatures of the spine and the flattening or bending inward of the ribs. In these cases the functions of the lungs are impaired, and the more advanced parts of the assimilative processes are impeded. In many of these cases, especially in those which are the most deformed, and when the spinal curvature is so extreme as to form a dorsal hump, the deformity continues through life, the duration of which it may considerably abridge, by favouring the super-vention of congestion of the lungs, or bronchitis, or pneumonia, or even asphyxia, by pressure on the origins of the spinal nerves. In some the curvature diminishes with the restoration of health, aided by suitable treatment and regimen; but in others it increases, sometimes after having been long stationary, owing to some change in the general health, or to de-

bility, or to disease, when ultimately a fatal termination takes place in the way now stated.

16. *D. The urine in rachitis* presents more or less change from the healthy state. Generally it is much more abundant than might be expected, considering the free transpiration from the skin. It is commonly pale, but it is sometimes of natural colour. The urea and uric acid are diminished, while the salts are increased. A free acid is sometimes observed, which has been said to be the phosphoric, but this requires farther investigation. The phosphates are more abundant than in health, and more especially than in healthy children; and a considerable sediment of oxalate of lime is not infrequent; and it has been observed that urinary calculi are frequent in rachitic children. As far as my own observation enables me to state, the increase in the fixed salts is most considerable during the advance of the first stage, and when the deformity begins to appear in the bones: it is less remarkable when the disease is far advanced, and the softening and flexures the greatest. The phosphate of soda and the earthy phosphates are most abundant. In a case examined by MARCHAND (*Lehrb. der Phys. Chemic.*, p. 338), the urine contained much lactic acid and lactates, and a great excess of the earthy phosphates. In a case by Mr. SOLLY (*Transact. of Roy. Med. and Chirurg. Soc.*, &c., vol. xx., p. 448), three or four times the usual amount of phosphate of lime existed in the urine. The exact composition of the urine during the third stage, especially during a return to the healthy state, has not been shown.

17. *E. Various complications* often occur in the course of this complaint. These may be either of an acute or chronic nature. Rickety children may be the subjects of the usual diseases of childhood, as whooping-cough, measles, scarlet fever, small-pox, &c., or of bronchitis, pneumonia, inflammatory irritation of the digestive canal, enlargement of the spleen, scrofulous enlargement of the glands, tubercular productions in the lungs and other organs, cutaneous eruptions, &c. Most of these are accidents by no means necessarily consequent upon the rickety constitution; but when the disease is far advanced, or is attended by deformity of the spine or chest, then the affections of the lungs, pulmonary congestion, effusions into the shut cavities, and disorders of the digestive organs, may be favoured by such deformity. The complications now mentioned, which are not specific, and which result not from infection, are often produced by certain of the causes which combine to produce this malady, or by influences to which children in this state are often exposed, more especially to various endemic influences, as a close, cold, and humid air, and injudicious diet. M. GUERSENT remarks that he has seldom found rickety children the subjects of tubercles, although he has observed two thirds of children who have died of other diseases present tubercular formations in some of their organs. M. RUFZ also states, that in twenty rickety subjects he found tubercles only in six. There can be no doubt of these complications having the effect of aggravating and accelerating the unfavourable progress of the disease in most cases, the only exceptions being when the eruptive fevers occur in a mild form, and then, in a few cases, they

have appeared to impart a new and favourable state of vascular action to the frame. In the most severe and advanced cases, other complications than those already mentioned often occur, and, in the weakened state of constitution, frequently terminate life. These are chiefly colliquative diarrhoea; hectic with colliquative sweats; congestion of the brain, with or without effusion, and attended either by coma or convulsions, fractures of the long bones on sudden motion, retention of urine, complete or incomplete palsy, chiefly in the form of paraplegia, and loss of one or more of the functions of life.

18. *F. The appearances after death* possess interest, not merely as respects the state of the internal organs, and the lesions in them to which death is more directly owing, but as regards the changes observed in the bones themselves. These latter changes can be observed in the early periods of the disease only when the patient is carried off by some complication or intercurrent disease. M. GUÉRIN has observed the alterations which take place in the bones during the three periods of the disease, and from his researches I am enabled to give the following account: (a) When death is caused by some acute disease affecting a rickety subject during the *first stage*, as sometimes happens, the long bones, when quite fresh and not previously exposed to the air, are congested with a large quantity of dark blood, which exudes from all parts when the bone is divided either longitudinally or transversely. This blood appears not to be contained in blood-vessels, but to be effused on each side, in the medullary canal between the medullary membrane and bone, in all the areolæ of the spongy structure of the diaphyses, of the epiphyses, and in the intermediate tissue which unites these two portions of bone, and under the periosteum, which is evidently injected and thickened. Blood is also interposed between the lamellæ of the compact structure of the bones, these admitting of an easy separation, and allowing this fluid to exude in numerous minute points. The blood is at first very fluid, and is readily removed from the surfaces on which it exudes; but, at a more advanced stage, it loses its dark colour, becomes gelatinous and semi-transparent, and adheres firmly to the surface of the osseous tissue. It then presents the rudiments of minute capillary vessels. During these changes in the blood the vessels of the bones acquire an increased development; the openings through which the vessels pass to and from the interiors of the bones are much dilated, and the osseous system is the seat of a remarkable sanguineous congestion, in which the small and flat bones also participate more or less.

19. (b) In the *second stage* the osseous tissue is manifestly more or less softened, admitting of flexures according as the weight, pressure, position, or muscular actions of the body may direct them. On examining closely the structure of the long bones, the swellings of the diaphyses and epiphyses are found to be owing to the development of a very fine spongy tissue, of a new formation, which M. GUÉRIN has named the "*spongoid tissue*," to distinguish it from the ordinary spongy structure. This tissue consists of very fine irregular areolæ, which replaces the sanguinolent fluid charging the bones in the first

stage, and is found spread out underneath the periosteum, forming a coat from one to two lines in thickness. It is found also between the lamellæ of the bones, where it may be detected by its darker color, and between the bone and the medullary membrane; but it is abundant around the epiphyses. It is also abundant, and more dense, at the concavities of the flexures than at the convexities; and it is found in both the long and flat bones. The periosteum is more or less vascular and thickened.

20. (c) The *third stage* presents changes in the bones very different from each other, according to the termination it assumes. When recovery and consequent re-ossification take place, the *spongoid tissue* of the new formation is nearly altogether transformed into a compact structure, especially in the concavity of the curvatures; and it is so abundant toward that part where the medullary canal is most contracted, as to invade the greater part of the canal by osseous lamellæ. While the compact structure acquires a very great density, it becomes the whiter the longer the duration of the consolidation, until it assumes the hardness and appearance of ivory. Disseminated through this structure in the diaphyses, and in the epiphyses as well, irregular open spaces are sometimes observed, apparently resulting from a partial absorption or from a retraction of the solid parts. When re-ossification does not take place, the compact structure is thin, fragile, dry, or compressible, especially around the epiphyses. The areolar tissue found within this thin osseous shell consists of large unequal or irregular cells, which extend throughout the whole of the medullary canal, which is filled with very fine osseous lamellæ surrounded by an oleaginous fluid. This alteration, which is found also in the epiphyses, M. GUÉRIN has named "*Rickety consumption of the bones*."

21. (d) It must be evident from these alterations that the bones will present important chemical results upon analysis, and that the chemical changes will vary with the amount of softening and of the alterations just described, and as these latter vary in different cases, in the same case at different periods, and in different bones in the same subject. According to BOSTOCK and BECQUEREL, the earthy constituents of the bones are remarkably diminished during the early stages of the complaint. In two children who died of pneumonia during the early period of rickets, the bones of the cranium presented but a slight diminution of the earthy phosphates, while the femur, the tibia, and the sternum contained only from a fourth to a twelfth part of the proportion usually observed in health.

22. (e) The complications of the disease above enumerated will suggest many of the visceral lesions observed in fatal cases of rickets, for to these death is generally more immediately owing. The brain is found more or less large relatively to the rest of the body; and fluid is often effused within the ventricles and between the membranes, which in a few cases have presented small or crude tubercular formations. Effusion of serous fluid is sometimes found in the pleural cavities, and the lungs often are pushed downward by the lateral pressure of the ribs. The bronchi are often inflamed or congested, the lungs are congested,

or in parts resemble the structure of the spleen, or contain, in some instances, tubercles in various stages of development. The heart is often paler than natural, and, in a few instances, has presented incipient organic lesions, especially when the complaint has been of long duration and the deformity of the chest has been considerable. The liver and spleen are often pressed downward by the thoracic deformity; and both organs are sometimes found more or less enlarged—the liver frequently paler than natural. The alimentary canal is generally very much distended by flatus, and the mesenteric glands are more or less enlarged, and occasionally contain crude tubercles. The different series of glands contained in the digestive villous surface are either enlarged or ulcerated, particularly when the disease has been complicated with intestinal disorder. The muscles are generally very flabby, pale, and wasted; the adipose tissue is wasted by absorption; and what remains appears soft and almost fluid. The whole of the structures, visceral and external, present a state of flabbiness or softness.

23. ii. DIAGNOSIS AND PROGNOSIS.—A. The *Diagnosis* of this complaint is sufficiently easy, excepting in the precursory stage, and then it is often as difficult as it is important to detect the approaching mischief. In this stage the complaint may be mistaken for several incipient diseases, especially for tubercles in the lung, for tubercular peritonitis, for tubercular disease of the brain or of the cerebral membranes, or of the spine. A short time and an attentive observation of the symptoms will soon show whether or not they agree with those described as characterizing the first stage (§ 4, *et seq.*); and when enlargement of the ends of the long bones, and especially when these become at all deformed, the diagnosis will be manifest. If any mistake should be made, or any difficulty of diagnosis between the incipient states of these maladies should arise, but little evil need result, as the treatment would not be inappropriate to either of them. It is evident from the changes observed in the bones, especially those evincing re-ossification, that the softening of the bones of children, or *true rickets*, is, in very essential points, a distinct disease from the *softening of the bones* sometimes observed in adults, especially in females, although I have considered it at this place as a species of rickets, from the softening and deformity attending it. This latter, the *true osteomalacia*, or *mollities ossium*, is never followed by re-ossification, especially when it is consequent upon chronic or malignant diseases, or the puerperal state. Curvatures of the spine supervening in the course of rickets should not be confounded with those curvatures caused by tubercular or scrofulous disease of the vertebræ on the one hand, or by relaxation of the ligaments, &c., on the other. (*See art. SPINE.*) Nor should it be overlooked, that the curvatures of the spine, so frequently observed connected with deformity of the chest, may exist in children as well as in adults, or young persons about the age of puberty, without the least degree of rickety change in the bones; that this curvature, as well as the deformity of the chest and sternum (described in article *CHEST, Deformities of*), may exist, on the one

hand, either separately or together, both in children and in adults, no other deformity of the bones being present; that either or both deformities may, on the other hand, supervene in the progress of true rickets, and of *mollities ossium*, or the rickets of adults; and that, when curvatures of the spine are thus associated with true rickets, or with *mollities ossium*, the bones of the pelvis are generally also deformed or contracted in various directions, more especially when the lower extremities continue much bent and shortened by true rickets, and when the softening occurs in adult age. It is worth noticing, also, that the extremities, especially the lower, not only cease to grow during the disease, but also continue much shorter during life, although they have acquired remarkable strength.

24. B. The *prognosis* depends not only upon the progress and severity of the complaint, but also upon the combination or persistence of the causes, and upon the effects produced by treatment. If the child be not remarkably debilitated, if the disease be not far advanced, and if the deformity have not invaded the spine, or pelvis, or parietes of the chest, a favourable result may be expected from treatment; but when vital power is much reduced, when the deformity is great, and has extended to the spine, or to the chest, or to the pelvic bones; still more especially when it is complicated with serious visceral disease or lesion, and when the deformity is such as to impede the respiratory functions, or when the head is affected, and sopor, coma, or convulsions supervene, or when the urinary functions are disordered, then complete recovery should not be expected; and, although life may in many cases be indefinitely prolonged, yet it may be very rapidly terminated, particularly in the latter circumstances. An unfavourable issue is the more likely to occur the earlier in infancy the complaint appears, the more serious the disorders which usher it in, and the more manifest and marked the predisposing causes existing in the parents.

25. iii. CAUSES.—A due recognition of the remote causes of rickets is of the utmost importance in preventing and in curing the disease.—A. The *predisposing causes* are not merely those which act externally on the child, but those also, and often especially, which are derived from the parents and the nurse—these latter sources, which have been too much overlooked at the present day, but to which BOERHAAVE and his commentator have directed attention: “*Maxime autem infestus habetur proli, cujus parentes laxa et debili conditione corporis, otiosi, molles, opipara mensa, cibis pinguibus, saccharatis, pauca pane, vinis dulcissimis, et aqua multa calida, usi, morbis chronicis, venere, ætate, exhausti, tabi inprimis venereæ, et iteratis gonorrhæis, multum obnoxii, effusam ferme genituram impenderunt generandis liberis.*” (§ 1482).—There is much truth in this enumeration of the predisposing causes derived from the parents. In respect of the influence to be ascribed to the exhaustion produced in the parents by chronic diseases, venereal excesses, and age, VAN SWIETEN remarks: “*Tales parentes, debiles, morbosos, languidos, infantes gignere, nemo dubitat. Unde inter signa sanitatis optimæ numeratur, si quis*

natus sit parentibus sanis, vegetis, plenæ ætatis, rara sed fervida venere utentibus. *Lycurgus* qui validis exercitiis firmabat virginum corpora, antequam viris jungerentur, voluit, ut recens nupti non cohabitarent, sed clam et furtiva quasi venere uterentur tantum, adeoque rara et fervida. Talem curam gessit robustæ et bellicosæ posteritatis. Facile patet, qualis proles expectanda sit a decrepitis, uti et ab illis, qui, in ipso ætatis vigore, libidine ac perditissimo vivendi genere exhausti, conjugia ambiunt, dum, ante trigesimum annum jam imbelles senes, lectissimas virgines turpiter decipiunt." (Vol. v, p. 587.)

26. There can be no doubt that these causes, so strongly insisted upon by BOERHAAVE and VAN SWIETEN, predispose to this disease in the offspring, by imparting an innate or congenital debility to the infant constitution, although they cannot be viewed as imparting a more especial tendency to it than to scrofula, or to other diseases of debility to which this is more or less closely allied. The children of parents who have married at a premature age, or who have indulged in sexual excesses, or who have been guilty of self-pollution, or who have become debilitated by other causes of exhaustion, as by living in unhealthy localities, or in the foul air of crowded factories, or by sleeping in close or crowded sleeping-chambers, are predisposed to this, among other maladies, which are allied more or less to each other, as respects their causes, rather than as regards their forms or seats. Certain of the predisposing causes existing in the parents, to which BOERHAAVE imputed a considerable influence, and which probably did, at the time he wrote, and still more so when rickets first became a frequent disease, possess this influence, namely, the taint or constitutional debility consequent upon venereal or gonorrhœal affections, may not, in the present day, produce this effect upon the offspring in so remarkable a manner as in those times; still I am convinced that they are not without some effect, although I believe that they are more influential in developing a scrofulous diathesis than in predisposing to rickets.

27. The effect of *leucorrhœa* upon the offspring, more particularly as predisposing to rickets, may admit also of doubt; still some of the best medical authorities have insisted upon the influence of this complaint in the parent. STORERCK contends that females who are subject to leucorrhœa are liable to suffer abortion, or to have rickety children. "Monebat, tales mulieres, nisi integre eurentur antequam nubant, facile abortiri, si conceperint. Dum felici arte cavebatur abortus ita, ut fetus ad maturitatem perveniret, notavit sequentia. *Tales autem fœminæ pariunt plerumque infantes crassos, pingues, robustos, et hi tales manent per plures menses: postea vero emaciuntur, lassi fiunt et membra pendula gerunt; tandem subsequitur pessima rachitis, quæ raro huc usque sanari potuit.*"

28. The predispositions referable to the children themselves have not been sufficiently investigated. Rickets have been observed in all constitutions: in the dark, the fair, the delicate, and the apparently robust; but most frequently in the delicate, in the sickly, in the soft and flabby, and in infants with large heads, whose fontanelles remain open, and whose dentition is delayed. Insufficient nourishment, unhealthy

milk, early weaning, or "bringing up by the hand," a watery farinaceous diet after weaning, a too exclusive use of vegetables, and the want of animal diet in cold and damp localities, and the periods of the first and second dentition, favour the occurrence of the complaint, especially in the constitutionally or hereditarily predisposed. Indeed, whatever debilitates the frame not only predisposes to rickets, but also sometimes more directly develops it.

29. *B.* No particular exciting cause can be adduced in some cases to account for the appearance of the disease, besides those which I have enumerated as being occasionally predisposing influences. But when these act in combination, and when other fortuitous circumstances aid their operation, they produce a more direct and exciting effect. Probably, however, residence in a cold and damp locality has a still more direct influence in developing rickets, even than those causes already mentioned, although without their aid this cause may not produce this effect. Indeed, the disease is even endemic in those places which are cold and damp, and where the poor are insufficiently fed and clothed. I believe that the abuse of spirituous liquors by either parent is not only a predisposing, but also an exciting cause of the complaint, and that it is more especially such when the vice is indulged in by the mother during the period of lactation. The murderous practice of giving narcotics to infants, so notoriously prevalent among many of the physically and morally degraded of the manufacturing population, may produce a similar effect where it fails of causing a more rapid extinction of life.

30. *C.* The proximate cause of the change in the bones, of which rickets is the result, is still unascertained. No satisfactory explanation of the changes which take place in this part of the frame has hitherto been adduced. It has been suggested that a superabundance of acid in the blood may cause the removal of the phosphates from the bones; but there has been no analysis of the blood in this disease, and the existence of an acid, and still less the kind of acid, in the blood have not been shown.* If the change were owing to the state of the blood entirely, it might be expected that the bones would undergo the same amount of softening and of chemical alteration throughout the frame. But this is found not to be the case, for the bones of the lower extremities experience these alterations in a much more marked degree and much earlier than those of the head or trunk. It may, therefore, be inferred that whatever agency the blood may exert must be directed or influenced by the vital or the organic nervous influence, to which the nutrition of the several structures is chiefly to be imputed. We only know that

* Although the existence of lactic acid in the blood has not been demonstrated, it may probably exist; for it is not unlikely that this acid is formed in excessive quantity in the digestive canal during the early stages of the disease, owing to the nature of the ingesta and the state of the primary assimilation, and that, being carried into the circulation, it there affects the functions of nutrition, and impairs organic nervous energy, although its accumulation in the blood, in a large or very sensible quantity, will be prevented by the depurative actions of the skin and kidneys. It may also be remarked, that the formation of lactic acid in the digestive canal, and its excessive excretion by the emunctories, are phenomena of familiar occurrence in rheumatism, in the puerperal state, and in several diseases, during which softening or other changes in the bones have sometimes taken place.

the disease results from many depressing causes, acting in various combinations, but always producing a constitutional debility, depressed organic nervous energy, imperfect assimilation and nutrition, and consequently a morbid state of the blood, with all the consecutive changes observed first in the softer structures, and ultimately in the bones; but our knowledge has advanced no farther than this, either in amount or in precision.

31. iv. TREATMENT.—A. The *prophylactic treatment* of rickets consists chiefly of the avoidance of the causes which occasion it, and of the adoption of those hygienic means which are requisite at all periods of early life, and more especially during the epochs of infancy and childhood. A healthy nurse, a warm and dry atmosphere, change of air, due ventilation, the animal warmth communicated by a healthy mother or nurse, suitable food—suitable as respects the periods of lactation, of weaning, and of dentition; attention to cleanliness, to dryness of the clothes, and to the warmth of the lower extremities, are the most efficacious measures, as far as concerns the child itself, that can be adopted for the prevention of this malady.

32. B. The treatment of the *successive stages* of the complaint depends much upon the visceral and constitutional disorders attending them. These disorders, especially when neglected or improperly treated in the first stage, tend to develop the rickets; and, in the second, either to retard recovery or to endanger the patient.—(a) When any of the affections which have been mentioned as complicating the *first stage* appear in conjunction with those symptoms or indications of incipient rickets, more particularly with an excess of the phosphates in the urine, the treatment of them should be conducted with much caution; for they have been too frequently viewed and treated as inflammatory, when they have been only the results of irritation, or consequences of the presence of irritating materials circulating in the blood, and of an asthenic state of organic nervous power. When, therefore, any of the disorders noticed above (§ 17) are observed to complicate this stage of the complaint, they should then be removed by means directed more especially to the improvement of the secretions and excretions, to the mitigation of both local and constitutional irritation, and to the promotion of vital power. In order that these intentions should be fulfilled with due success, the states of the perspiration, of the urine, and of the intestinal discharges should be carefully and almost daily examined. The urine particularly ought to be tested and chemically investigated, and upon the states of these excretions the choice of medicinal agents, as well as of diet and regimen, should mainly depend. The primary processes of assimilation especially require attention, and these are generally most efficiently promoted by a suitable diet, and by a warm and dry atmosphere.

33. When the *urine*, although abounding in phosphates, nevertheless presents an acid reaction, and when it does not become rapidly offensive, then alkalies may be given with tonics, sedatives, or alteratives. The irritative fever and quickness of the pulse, frequently attending the first stage of the disease, have often

induced the physician to prescribe lowering means when a restorative treatment was actually required. But the attendant fever being characterized by nervous asthenia, by copious or colliquative perspirations, by pale phosphatic urine, by general pallor, and by the softness of the pulse, these furnish sufficient indications for restorative remedies. The alkalies most serviceable in these circumstances are the carbonate of potash, the liquor potassæ, or BRANDISH's alkaline solution, or magnesia, with infusion or decoction of cinchona, or infusion of cascarrilla, with aromatics. If the carbonates be prescribed, small doses of the dilute hydrocyanic acid, or of the extract or tincture of conium, will be of use. If the urine present only a slightly acid reaction, or if it be already, or soon become alkaline, the mineral acids, especially the hydrochloric and the nitric, or the combination of both, may be given with aromatics, or with small doses of the hydrocyanic acid, or of opium, or of conium.

34. If the *bowels* be confined, they should be sufficiently opened, and all faecal accumulations and morbid secretions evacuated by means of stomachic aperients, especially the compound decoction of aloes, or equal parts of the compound infusions of gentian and senna, or rhubarb with aromatics. When the stools are devoid of bile, it will be preferable to attempt to procure an increased secretion by means of the nitro-muriatic acids, given internally, or used externally at a warm or tepid temperature, than to administer mercurials, which tend to depress still farther the already impaired organic nervous power. Occasionally, however, the *hydrargyrum cum creta* will be given with benefit in conjunction with rhubarb, and cinnamon or ginger. If the patient be so old as to swallow a pill, these will be most advantageously combined with the inspissated or purified ox-gall. If the bowels be relaxed, or the stools yeasty, and the patient much griped, or pained generally, the alkaline medicines (§ 33) may be given in lime-water and milk, with minute doses of tinctura opii, or of tinctura camphoræ composita, or of tinctura lupuli; and an enema, containing the same ingredients, may be occasionally administered. In these latter circumstances, liniments or embrocations containing either of the balsams or turpentine, or camphor, applied over the abdomen, are of essential service. The terebinthines and balsams are severally of use, when given internally, but they ought to be prescribed only occasionally, and in small doses, so as not to irritate the urinary organs. Emetics have been advised, but they are of service only when this stage is complicated with hooping-cough or bronchitis, and even then chiefly with the view of procuring a discharge of accumulated secretion from the bronchi, when there is difficulty in expectorating it. During this period, as well as in the second, when there are marked pallor of the surface, and frequent sweats, the *mistura ferri composita*, made agreeable with liquorice powder, is eminently beneficial; and if any pulmonary symptom exist, conium should be added. If the bowels are torpid, this mixture may be conjoined with the decoction aloes compositum.

35. In this stage, as well as in the next, sponging the back, loins, and thighs with a tepid solution of bay salt, or with tepid sea-wa-

ter, is generally of service, especially when followed or preceded by active friction of the surface. The complaint in this stage is often quickly arrested by change of air, especially to a warm and dry situation, and more particularly to such a situation near the sea-coast. In the cases of infants at the breast, due attention should be paid to the states of health and of the milk of the nurses; and the treatment of the infant should be partly conducted by directing such means to the mother or nurse as will correct or improve this secretion. If this object cannot, or is not likely to be attained, a healthy nurse should be procured. If the complaint appear about or after the period of weaning, a sufficient quantity of ass's milk should be given daily; or the farinaceous articles of diet may be allowed with mutton, veal, or beef broth or tea; or warm jellies, or the yolk of an egg, may be taken once or twice daily.

36. *C.* In the *second or deformed stage*, the treatment should be in many respects the same as now described. The febrile irritation sometimes observed is still more remarkably the result of debility, conjoined with a morbid state of the blood, than in the first stage; and hence it ought not to interfere with the adoption of tonic and restorative medicines, which, when duly selected, will be the most efficient means of improving the various secretions and excretions. As in the former stage, so in this, a particular attention should be directed to the urine; and according to the states of this excretion, as well as of that from the skin, the decoction or infusion of cinchona may be given with the nitric or muriatic acid, or with both, or with the solution of potash, or with BRANDISH's alkaline solution, or with a preparation of ammonia and some warm aromatic. The sulphate of quina with sulphuric acid may be substituted for the above, especially when the skin is flabby and covered with perspiration, and if there be obvious anæmia, or even in other circumstances, the compound steel mixture may be given as above (§ 34), or the muriated tincture of iron in the infusion of calumba or quassia, or the iodide of iron in the sirup of sarza. This is the best preparation of iodine for this disease; although the iodide of potassium, taken in a tonic decoction or infusion, is often of service. In this stage, and not less so in the first, the cod-liver oil will be found very remarkably beneficial. I have prescribed it for every case of this complaint which I have seen since 1844. This oil is now prepared by the principal chemists in the metropolis from the fresh livers, and, thus prepared, it is a much less unpleasant medicine than in the state in which it was formerly procured. But of the several fish oils which may be prescribed—those of the cod, of the ling, of the skate, &c.—the oil from the liver of the torsk is certainly to be preferred, according to my observation; and it may be readily procured from the Shetland Isles, the only place in this kingdom where this fish is abundant.

37. In this stage more particularly several earthy preparations have been recommended with the view of furnishing the materials for the re-ossification of the bones. But as the disease is not so much the result of any deficiency of the elements of bone in the nutriment as in the failure of organic nervous or

vital energy, whereby these elements form and unite in the tissues during the processes of assimilation and nutrition, so it may be inferred that much less importance may be attributed to the administration of substances containing the constituents of bone than has been attached to it by some writers. Nevertheless, as several of these substances are useful in controlling certain of the symptoms, or in exciting the actions of assimilating organs, or in rousing organic nervous power, they may be given with advantage, especially lime-water charged with fixed air, magnesia similarly charged, or effervescing, or either of these conjoined with other means; the muriates or chlorides of lime, or of baryta in minute doses, and the phosphoric acid and certain of the phosphates; but it is doubtful whether these latter are beneficial or injurious in any stage of rickets. I have prescribed the chlorate of potash with other tonics in several instances with benefit; and when the liver is torpid, small doses of mercury with chalk and rhubarb; or, when the stools are frequent, acid, and yeasty, with the compound cretaceous powder, or with this powder and minute doses of opium. In these latter circumstances, the treatment above recommended when colliquative diarrhœa is present (§ 34) may be adopted, or powders may be given containing small doses of powdered cascarilla bark, cinnamon, and the carbonate or sulphate of iron. Most of the preparations of iron are beneficial in this stage, more especially those already mentioned, and the citrate of iron, the tartrate of iron and ammonia, and the vinum ferri, either of which are readily taken by children.

38. In this stage, the same *external means, diet, and regimen* as was prescribed for the first should be observed, varying each according to the effect and the peculiarities of the case. BOERHAAVE, VAN SWIETEN, and others have advised, and I am confident that the advice is judicious, that the utmost care should be taken to preserve the beds and bed-clothes clean, fresh, and perfectly dry; and to dust the surface of the body with tonic, astringent, and aromatic powders, especially when the perspirations are colliquative or weakening, and after warm salt-water bathing or sponging, or after the tepid salt-water douche on the back, loins, or limbs. In this state of the complaint, tepid chalybeate baths, variously medicated baths, and the thermal springs, recommended for chronic RHEUMATISM (§ 142), may be employed, as well as the Tunbridge waters, and the natural or factitious mineral waters recommended for that disease (§ 151). The child should be kept as much in the open air as the temperature and weather will permit, and in the sunshine. The utmost care ought to be taken that the position, either when lying, or when being lifted or held up, should be such as not to bend the bones from their natural direction. As the weight of the trunk and head is apt to bend the long bones, when the patient is allowed to stand or walk, either too early or in this stage; and as the weight of the head is liable to produce curvatures of the spine, when the patient is allowed to sit too long or too much, a recumbent or reclining position should be adopted at intervals, or for a considerable period during the day. A properly constructed couch or bed, on which the patient may lie either on the back or

on the abdomen, and use his arms and hands without difficulty, will prove of great benefit; and a recourse to frictions of the surface, especially over the back and abdomen, will at the same time be of service. Galvanic or magnetic electricity will be productive of much advantage in this disease, especially if aided by judicious treatment, regimen, and diet. When the legs are chiefly or only affected, standing or walking should not be allowed. In these cases, particularly when the curvatures are outward, I have often directed the legs to be tied together, or confined by a broad band, bandage, or handkerchief, so as to prevent walking, and to resist the curvatures, or press the flexures in a proper direction. For this and other kinds of curvature, various mechanical modes of treatment have been employed; and iron, or steel, or metal supports, or implements of different kinds and shapes, have been adopted. But these means, although sometimes of service in diminishing superincumbent pressure, or in resisting the disposition to flexure, are often injurious by preventing the muscular actions, and by embarrassing the circulation of the parts or limbs. Moreover, all metal supports are injurious, however carefully they may be covered, by conducting the animal heat, and the electricity always circulating through the frame, and favouring the passage of both into the surrounding air. When the complaint is either so severe or so extensive as to implicate the vertebral column or the parietes of the chest, or both the one and the other, the remarks I have offered on deformities of the CHEST, as well as those of the SPINE, are altogether applicable to those more extensive forms of rickets. (See CHEST and SPINE.)*

39. II. RICKETS IN ADULTS.—SYNON.—*Mollities ossium*; *Osteomalacia*; *Malacosteon*, *softening of the Bones in Adults*, &c.—This complaint, although resembling in many respects the rickets of children, is in others a different disease, more especially as respects the changes which take place in the texture and fibrous membranes of the bones. It is more frequently observed in females than in males, and it oftener affects the pelvis and spine than other bones; but it may extend to nearly all the bones, such cases, however, being very rare. I can add nothing at this

place to what I have adduced respecting the *causes, nature, and treatment of mollities ossium, or the softening of bones in adults*, in the article OSSEOUS SYSTEM (§ 27, et seq.).

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* [With respect to the use of instruments it is proper to remark, that they should never be applied to the limbs in young children, as they can neither be necessary nor useful, and by their weight, and by preventing exercise, they must tend to increase the general debility, and thus do much injury. If used at all, they are to be deferred until the bones of the trunk possess some firmness, and then be made only in cases where the larger bones of the limbs, as well as those of the trunk, are hard enough not to be injured by their additional weight and the pressure necessarily made by them in correcting the distorted shape of the bones below. Incurvations of the spine are so frequent, and in females are productive of so much more serious consequences than mere deformity, that the commencement of such affection, in that sex particularly, should be carefully guarded against; and when it has begun, the mode of treatment intended to remove it should be most attentively considered, and, when approved of, should not be delayed. In this disease, we believe the incurvations of the spine will generally be lateral, while, from curves of bodies of the vertebrae, the bend is forward. Indeed, there may be several of these lateral curves, from the attempts made to support the weight more favourably by counteraction, giving to the spinal column the shape of the Italian f. I have, however, seen instances where the spine has been bent forward in this disease, accompanied by a posterior angular projection, as in curves, several examples of which I observed in the splendid Dupuytren Museum in Paris.]

ROSE-RASH.—SYNON.—*Roseola* (from *rosa*, a rose; or from the Italian *Rosso*, red), Willan, Bateman, &c. *Rossalia*, *Rossama*, Auct. *Exanthisma roseola*, Young. *Exanthesis roseola*, Good. *Rubcola spuria*, Frank. *Rossellina*, Auct. *Roscole*, Eruption, *rosacée*, *Fausse rougeole*, Fr. *Rothlen*, *Rother hund*, Germ. *Red-rash*, *False Measles*.

CLASSIF.—3d. Order, Exanthemata; 4th. Genus, *Roseola*; Rose-coloured efflorescence (Willan). III. CLASS, III. ORDER (Author).

1. DEFINIT.—An eruption of small rose-coloured patches, of irregular forms, very slightly elevated, not papular, transient, and passing into a deeper roseate hue as they slowly disappear; the patches being either limited to a part, or to the limbs, or dispersed over the body, preceded and attended by slight fever, and non-infectious.

2. Under the term of *roseola*, modern writers have described several forms of eruption, which are chiefly symptomatic, and which, in appearance, are intermediate between erythema and urticaria, but more closely allied to the former than to any other eruption. Indeed, RAYER doubts as to the propriety of considering *roseola* as a distinct genus, and of not viewing it as a variety of erythema. Although approaching the appearances of the milder forms of measles and scarlatina, yet the severer, the specific and infectious characters of these, can suggest neither resemblance to, nor alliance with this eruption.

3. I. DESCRIPTION.—This eruption is generally preceded by slight fever and disorder of the digestive organs, for two, three, or even four days, rose-coloured patches then appearing either on parts or over the body. The patches are larger, paler, and less uniform than the spots of measles. They are also more distinct, and are separated from each other by intervals of healthy skin. They are attended by itching and tingling, and frequently disappear in twenty-four or thirty-six hours; but they sometimes subside, and return alternately for seven or eight days. The varieties of this eruption have been divided into the *idiopathic* and *symptomatic*—the latter accompanying or complicating other diseases; the former depending upon less obvious changes, although frequently proceeding from disorder of the secreting and excreting functions.

4. i. *Roseola æstiva* is the most severe of the more idiopathic varieties. It is preceded and attended by constitutional disorder, and generally appears first on the arms, face, and neck, spreading in the course of a day or two to the rest of the body, and causing itching and tingling. The patches present the appearances just described, and are at first of a lively red, but soon acquire a deeper tint. The pharynx often presents the same hue, and a roughness or dryness is felt on swallowing. The eruption continues fully out on the second day, but immediately afterward begins to decline; slight patches of a dull red often continue to the fourth day, and disappear entirely on the fifth, with the constitutional disturbance. Sometimes the efflorescence is limited to parts of the face and neck, or breast or shoulders, and is very slightly elevated. The patches itch very much, but are without the prickings or stinging of urticaria. They last at most a week;

but they occasionally appear and disappear again and again, either owing to violent moral affections, or to spiced food or heating beverages, or to no very manifest cause. The recession of the eruption is often attended by disorder of the digestive organs, or by headache, or by lassitude, which are relieved by the return of the efflorescence. This variety is met with in summer, most frequently in females of irritable temperament, and in delicate persons with an irritable state of the skin. It is often connected with disorder of the digestive canal, and in its external characters is intermediate between erythema and urticaria.

5. ii. *Roseola autumnalis* attacks children in the autumn. It appears in the shape of distinct circular or oval spots, of a dusky red colour, that gradually increase until they reach the size of a sixpence or shilling, and are observed chiefly on the arms and legs. The patches sometimes end in desquamation, are not attended by itching or tingling, and rarely continue longer than a week. This variety is evidently very closely allied to, if not a form of, erythema.

6. iii. *Roseola annulata* is attended in some cases by febrile symptoms, and is then of short duration; but in others there is little or no constitutional disturbance, and the eruption continues much longer. It appears nearly on every part of the body in the form of rose-coloured rings, of various sizes, the centres of which are of the natural hue of the skin. The rings at first are only a line or two in diameter; but they gradually enlarge to half an inch, or even more. They are less vivid in the morning; but they revive toward evening or night, and are attended with itches and tingling. As they vanish or fade, the stomach is disordered, and languor, pains in the limbs, and vertigo are complained of. In the chronic state of the eruption, the rings have a sallow or discoloured hue, and often recede and recur alternately, thus enduring for weeks, or even months. I agree in the opinion of M. RAYER, that this is merely a modification of *erythema annulatum*.

7. iv. *Roseola infantilis* presents spots of small size, and more closely grouped together, so that, looking only at the eruption, and without reference to other, especially the catarrhal symptoms, it may be mistaken for *measles*; but there is less roughness of the surface than in this latter. This mistake has, however, been often made. This variety of *roseola* attacks children during dentition, or during febrile affections or disorders of the digestive canal. It may occur only for a single night, or it may come and go alternately for several days. It may also appear in succession in different parts of the body. It is accompanied with febrile symptoms, and more or less disorder of the digestive organs. As respects the extent of eruption, and the sensations experienced, this variety closely resembles *roseola æstiva*.

8. v. *Roseola variolosa* is symptomatic of the natural and inoculated small-pox. M. RAYER states that it precedes the former more rarely than the latter, in which it is calculated to appear about once in fifteen cases, in the course of the second day of the eruptive fever, which corresponds with the ninth or tenth day after the inoculation. The efflorescence is first perceived on the arms, the breast and face, and on

the following day extends to the trunk and extremities. The long, irregular, and diffused patches leave numerous intervals between them. This variety of roseola is, in a few cases, characterized by an almost generally diffused efflorescence, slightly prominent in some points. It lasts about three days; on the second and third, the variolous pustules may be distinguished amid the roseola efflorescence, by their roundness, prominence, and hardness, and the whiteness of their summits. As soon as the pustules appear the roseola declines. This variety has been regarded as indicative of an eruption of distinct small-pox; but this is generally not the case, more especially when the roseola is of a deep or dusky tint, and the eruptive fever severe, the small-pox eruption becoming then confluent. The earlier writers mistook this variety of roseola for measles, and concluded that measles were sometimes converted into small-pox. This variety occurs chiefly in persons having a delicate and irritable skin, and is very closely allied to erythema.

9. vi. *Roseola vaccina* is sometimes observed in children from the eighth to the tenth day after the insertion of the vaccine virus. It appears as small confluent spots or patches, or is diffused like variolous roseola, commencing when the areola is formed around the vaccine vesicle, from whence it extends irregularly over the surface of the body. It is accompanied with frequency of the pulse, anxiety, and general disturbance; but it occurs less frequently than the variolous variety. It rarely continues longer than two or three days, affects chiefly those of a delicate and irritable skin, and, like the preceding, is intimately allied to erythema.

10. vii. *Roseola febrilis* and *R. miliaris* are merely modifications of erythema, and are, in rare instances only, observed in the course of fevers or accompany miliary vesicles, especially when those are attended by much perspiration. The patches are of a bright rose colour, of an oval shape, slightly prominent and smooth, and occur chiefly on the chest and insides of the arms. There is seldom itching. The patches usually disappear after two or three days.

11. viii. *Roseola arthritica* is the appearance of a rose-coloured rash in connexion with attacks of *gout* or *rheumatism*. This, however, is only a rare occurrence in this country, the efflorescence either preceding or attending the arthritic disease. Dr. SCHÖNLEIN has described this variety under the term *Pelliosis rheumatica*; and Dr. FUCHS states that the rheumatism which is thus complicated is endemic in Würzburg; that it attacks adult males most frequently during winter and spring, when the air is cold and moist; and that the eruption is then oftenest met with. The pains are usually experienced in the articulations and extremities; remit, change their place, are increased by cold, and diminished by the warmth of bed. Gastric symptoms, shiverings followed by febrile reaction, dry and hot skin, loss of appetite, and furred tongue, usher in the eruption, which appears on the second, third, or fourth day after the commencement of these symptoms, usually at first on the legs, and sometimes going no farther, but more frequently coming out on the arms and shoulders at the same time, very rarely on the trunk, and never on the face. The

eruption consists of small, distinct spots, varying from the size of a millet seed to that of a lentil, rounded, and of a deep red or violet red hue. The spots are not so numerous as the vesicles of miliaria, or as the spots of measles. Upon the occurrence of the eruption the fever ceases, and the rheumatic symptoms abate. The spots, whose numbers may be increased by successive crops, grow pale, and terminate by a slight furfuraceous desquamation. The arthritic roseola described by PETZOLD and HEMMING is similar to that just noticed; but the exanthematous rheumatic fever, which was epidemic in the West Indies in 1827 and 1828, and which was described by STEEDMAN, NICHOLSON, and COCK, and supposed by RAYER to have been this variety of roseola, was more nearly allied, as regards the eruption, to scarlatina than to roseola; and it, moreover, appeared to have been, in the opinion of, and according to evidence by these and other writers, an infectious malady.

12. ix. *Rubcola cholericæ* is one of the forms of eruption which occasionally appears on the surface of the body during the consecutive fever of the *cholericæ pestilence*. This variety was first noticed by Dr. KEIR at Moscow, and more fully described by Dr. BABINGTON and MM. DUPLAY and RAYER. But the eruption observed in some cases of this pestilence does not always present the rubeolar characters; for I have observed it to possess, in different cases, more of the appearances of scarlatina, of measles, of nettle-rash, or erythema, and even of erysipelas, with the attendant tumefaction, than of roseola. M. RAYER describes the eruption as occurring most frequently in women, appearing first on the hands and arms, and extending to the neck, breast, abdomen, and lower extremities. At its commencement the spots were of an irregularly circular form, of a bright red colour, elevated above the surface, and but slightly itchy. They were most numerous on the hands, arms, and chest; and in some places they were crowded, or almost confluent, more especially on the chest, where they sometimes formed, by their confluence, patches as large as the hand, somewhat raised, and well defined. The eruption then presented a dirty pink or rose colour. About the sixth or seventh day the epidermis cracked, and was thrown off in large scales, where the eruption had existed. M. RAYER has seen this eruption complicated with inflammatory affection of the fauces and tonsils, and its disappearance followed by an aggravation of the symptoms, and sometimes even by death.

13. II. DIAGNOSIS.—*a.* Roseola, especially the varieties autumnalis and annulata, is distinguished with difficulty from *erythema*. In both kinds of eruption the patches are irregular and uniform in tint, but are generally smaller in roseola than in erythema. When the febrile disturbance of the former is well marked, and the patches of eruption dispersed over the body, then the diagnosis between it and the latter will not be difficult.—*b.* Roseola æstiva and *R. infantilis* most closely resemble the eruption of *measles*, for which they have been often mistaken; but the absence of catarrhal symptoms, the less degree of fever, the larger size and more irregular form of the patches, the progressive advance of the patches from the ex-

tremities to the trunk, and their uniform redness, distinguish these varieties from the punctiform appearance of the eruption of measles. The infectious and often epidemic nature of the latter should also be taken into account. SYDENHAM considered roseola to be a variety of measles, and several other writers believed that the former was only a spurious variety of the latter. HOFFMANN, BORSIERI, and SELLE pointed out the difference, and contended that roseola was an exanthem sui generis, and distinct from the other exanthemata.—*c.* Roseola may be distinguished from *scarlatina* by some of the circumstances just adduced; but more especially by the severity of the constitutional symptoms, and the state of the throat and tongue.—*d.* The light-coloured and raised spots and wheals of *urticaria* can hardly be mistaken for the more uniformly red patches of roseola. The itchings, tinglings, prickings, and stings are much more severe and generally experienced in the former than in the latter.

14. III. CAUSES.—Roseola occurs chiefly in children, in females, and persons of a delicate constitution or irritable temperament. It is generally occasioned in infants and children by teething and irritation of the digestive canal. In adults it is most frequently caused by errors of diet or regimen, especially during summer and autumn; by hot spices; by overheating the body by exercise or exertion; by drinking cold fluids, or exposure to cold air when the body is perspiring; by eating shell-fish or other indigestible substances; by acid fruits, pickles, preserves, &c.; by heating or exciting beverages; and by whatever irritates the stomach or bowels. It may be symptomatic of a morbid state of the blood consequent upon impaired or interrupted secretion and excretion, especially from the skin, liver, or kidneys, and in females from the uterus.

15. IV. TREATMENT.—This eruption requires but little treatment beyond the removal of the causes, remote and pathological, as far as they may be manifest, and the due promotion of the secretions and excretions. When the eruption occurs in the course of acute or constitutional disease it should be viewed as critical, and be interfered with as little as possible. When it affects children, small doses of hydrargyrum cum creta, soda, and rhubarb, or simply the gray powder and magnesia, followed, after two or three doses, by a little castor oil, will generally be sufficient to remove it; and if the gums be hot or swollen, and the state or period of dentition suggest the operation, scarifying the gums will be of service. In some cases the liquor ammoniæ acetatis with spiritus ætheris nitrici, in camphor water, or in any other suitable vehicle, will be of farther benefit. In adults, after duly evacuating the bowels and promoting the alvine secretions, tonic infusions or decoctions, with nitre and alkaline subcarbonates, will be taken with immediate advantage. When there is much itching and tingling of the skin, a tepid or warm bath will give relief. When any of the excretions are disordered—whether the biliary, the intestinal, or the urinary—the treatment should be directed accordingly; and if menstruation is difficult, painful, or scanty, the biborate of soda may be given with an aloeic preparation and the compound galbanum pill, and when the eruption

has disappeared, the *misturi ferri composita*, or other preparations of iron, may be taken in such combinations as the peculiarities of the case will suggest. The more obviously symptomatic varieties of roseola should be treated according to the nature of the disease, of which it is merely a sympathetic, and generally a not very important manifestation, unless when it assumes a deep or dark hue, and then there is a manifest indication for the employment of tonic and restorative means. The diet should be light, chiefly farinaceous, and moderate, and the regimen in other respects antiphlogistic.

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RUBEOLA.—SYNON.—*Morbilli scarlatinosi*, *Scarlatina morbillosa*, *Scarlatina hybrida*; *Morbilli*, *Scarlatina*, *Roscola*, *Rossaria*, Auct. Var. *Rougeole*, *fausse rougeole*, Fr. *Rötheln*, *Feuermasern*, Germ. *Rosalia*, Ital. *Bastard measles*, *Bastard scarlatina*, *hybrid measles* or *scarlet fever*.

CLASSIF.—III. CLASS, III. ORDER (Author).

1. DEFIN.—Fever attended by coryza, redness and watering of the eyes, redness and soreness of the throat, pains in the head, back, and limbs, attended on the third or fourth day by the sudden and general eruption of a red efflorescence, which terminates about the tenth day in desquamation; the disease presenting the characters of measles and scarlet fever conjoined.

2. It is doubtful whether or not this should be viewed as a distinct or specific form of disease, or merely a variety of either measles or of scarlet fever, in which many of the characters of either the one or of the other predominate. I have, as will already appear, considered it as a hybrid, combining the chief characteristics of both these exanthemata. Since the days of the Arabian writers, until recent times, certain of the exanthematous fevers were considered as being merely modifications of the same disease; and it was only as late as the close of the last century that the distinctions between scarlet fever and measles were fully determined and generally recognised. More recently still, the differences have been more absolutely believed in than an extended and diversified experience warrants; for the medical writings of the 17th and 18th centuries contain the histories of epidemics, which, according to the descriptions they furnish, present characters which belong both to measles and to scarlet fever. The experience of physicians, also, that has been prolonged through a number of years, or been extended to different countries, has furnished instances of either sporadic cases or of prevailing and malignant epidemics, in which some, if not the majority, of the cases have presented the mixed features of measles and scarlatina. Even the notices of measles contained in the works of RHASES and other Arabian physicians furnish indications that this

form of disease, to which the term rubeola has been applied by myself and others, was actually known to them, they viewing it as a variety of measles; although they afford no distinct proofs of an acquaintance with scarlatina.

3. From the description which J. FRANK has given, it is evident that he misapplies the term rubeola to the more general and severe forms of roseola; and M. RAYER appears to entertain a similar opinion. Indeed, the French writers use the word rubeola either with reference to measles or to roseola, to the former especially, and have not recognised this hybrid malady, which has engaged the attention of so many German writers since the commencement of the present century, and whose existence clears up many of the difficulties which present themselves on reading the accounts of epidemics that have possessed the mixed characters of this malady. RICHTER and HILDENBRAND have defined rubeola to be a species between measles and scarlet fever. The latter writer states "that *rubeola* holds a place between measles and scarlet fever, the name being derived from its deep red colour. Authors differ much as to its nature, and have applied the term indiscriminately to measles and to other species of exanthem. Neither in France nor in Italy are these names appropriate to measles and to rubeola individually; *rougeole* in the former country, and *rosolia* in the latter, being applied indiscriminately to both." The Arabian writers viewed the eruption to which recent German writers have applied the name *rubeola* as a variety or modification of measles; and at a much later period, INGRASSIAS, FORESTUS, BALLONIUS, SENNERTUS, and others, have so confounded rubeola with scarlet fever, as that the accounts they have given are equally applicable to either species of disease, owing both to their short and imperfect descriptions, and to their arbitrary or indiscriminating use of the terms rubeola and scarlatina. Towards the close of the last century, SELLE described measles (morbilli) and rubeola as distinct affections, and during the commencement of the present century several German writers, especially ZIEGLER, REIL, FIELITZ, JAHN, HUFELAND, SCHLEFFER, FORMEY, FLISCH, and HEIM, have given correct descriptions of epidemic rubeola.

4. I. DESCRIPTION.—(a) During the *febrile stage*, rubeola furnishes most of the catarrhal and febrile symptoms observed at the commencement of measles and scarlet fever: a defluxion from the nostrils, redness of the eyes, frontal headache, cough, watering of the eyes, great heat and dryness of the skin. Sometimes rheumatic pains, retchings, somnolence, dull headache, itching of the eyes, are observed to precede the eruption. Inflammatory redness of the fauces, tonsils, and pendulous velum of the palate, is never absent unless in the slightest cases. According to HEIM, patients emit a similar odour to that exhaled by those affected by scarlet fever.

5. (b) On the third or fourth day an *eruption* or exanthem breaks out over the whole body, as if at a single effort. It is, however, more scanty on the face; and it presents two forms, the one consisting of red spots, with irregular margins, varying from a line to a line and a half in diameter, and remaining distinct throughout their course; the other of red spots, of the

size of millet seeds, possessing no distinct margins, and becoming paler from the centre to the circumference. In mild cases the efflorescence is discrete; but in the severer cases it is much more abundant, and the spots larger, being about two lines in diameter; so that, on the second day of the eruption, it imparts to the whole surface a deep and almost equal red colour. Rubeola may now be readily mistaken for scarlatina; but it may be distinguished by the circumstance of the red spots being different from the scarlatinous exanthem, those pressed on by the finger becoming pale, but very quickly regaining their red hue from their centres to their circumferences. The general redness of rubeola, which equals that of scarlatina, fades after two days, the spots still remaining, and small miliary phlyctenæ appear and impart a roughness to the skin, and become filled with a little whitish and thick fluid. During the eruption the constitutional symptoms of the first stage are increased, and others often supervene, as hoarseness, or loss of voice, severe cough, oppression in the chest, vomiting, delirium, or convulsions in young subjects. After the eruption has come fully out, which takes place within twenty-four hours, it continues from six to ten days, retaining its assigned form, and the anginous and febrile symptoms undergo a marked diminution, unless when the affection of the throat becomes aggravated, which sometimes occurs.

6. (c.) About the tenth day from the commencement of the disease, the eruption becomes pale and disappears, *desquamation* supervening in proportion as this change proceeds, the anginous and febrile symptoms equally subsiding with the progress of desquamation. This change is often connected with a critical evacuation, as sweats, hypostatic urine, epistaxis, &c. Desquamation proceeds from the centre of each spot, the scales presenting a round or stellated appearance, and without any unpleasant sense of itching.

7. (d) In the most unfavourable cases, rubeola either *terminates* in death, owing to the same circumstances and changes as are observed in measles or scarlet fever, or occasions those visceral affections and their consequences, which are described in connexion with these maladies, and which often render the ultimate issue doubtful. Of these consecutive affections, the most frequent are those of the respiratory passages and lungs; of the glands, and of the digestive and urinary organs; and dropsy, especially anasarca. Rubeola, although frequently a mild, is sometimes a most severe or even dangerous malady, especially when it is epidemic. The epidemics described by SELLE presented a malignant character, and were fatal to many; and that noticed by FORMEY was of a putro-adynamic kind, and was very fatal in Berlin.

8. II. NATURE.—Several authors believe rubeola to be a specific contagious disease, and therefore belonging to the class of pestilential fevers. Some, however, consider it a variety of one or other of the diseases which it so closely resembles—of either measles or scarlatina. HILDENBRAND states "that some consider it, with HUFELAND, SCHLEFFER, FORMEY, and HEIM, as a variety of scarlatina; and that KAPP, WICHMANN, and REIL view it rather as allied to measles; while UEBERLACHER, JAHN, and

FLEISCH believe that no essential difference exists between measles, rubeola, and scarlet fever." According to this last opinion, rubeola should be viewed as the connecting link between measles and scarlet fever. That rubeola, on the one hand, is very nearly allied to scarlatina, is shown by the affection of the throat, by the intense redness of the skin, by the mode of desquamation, by the peculiar odour proceeding from the patient, by the contemporary existence of both forms of exanthem in different persons in the same locality, and by the consecutive appearance of dropsy in some instances; but that rubeola, on the other hand, is equally allied to measles, is shown by the catarrhal symptoms—by the coryza, cough, watering of the eyes, and hoarseness; by the form of the segregated spots, forming a part of the eruption, and by the occasional prevalence of it at the same times and places as measles, as HILDENBRAND states that he had himself observed. Many writers farther allege, as proofs that rubeola is merely a variety of measles, the belief in scarlatina being a comparatively recent disease, while notices of rubeola are found in connexion with measles in the writings of the Arabian physicians. I believe that rubeola is not a disease, *sui generis*, nor yet a modification merely of either measles or of scarlet fever, but a hybrid of these two fevers, presenting sometimes a predominance of the symptoms characteristic of the one, at other times of those distinguishing the other, and not infrequently an equal combination of the features of both. In this opinion I differ little from that held by HILDENBRAND. REIL believed rubeola to be a species of exanthem between measles and scarlet fever; while MARCUS considered it to hold the same relation to both these exanthems as exists between true and spurious small-pox. But it may be asked, to what cause can this hybrid state of disease be imputed? Can the copulation of measles and scarlet fever be assigned to epidemic states of the air, or epidemic constitution, or to the conditions of season or weather? Or may it be considered an accidental combination, or a coincident appearance of both maladies, in an epidemic form, at the same time and among the same population, the characteristic features of either malady predominating according to the predisposition, constitution, &c., of the individuals affected? This latter view appears by no means unreasonable, although the dogma of JOHN HUNTER, so long believed in, but now disproved, that two diseases cannot exist in the human economy at one time, may still appear to some, but without sufficient reason, to militate against it. (See MEASLES, § 48.)

9. III. TREATMENT.—The treatment of rubeola must entirely depend upon the type or character it assumes, either sporadically or epidemically; and hence the principles of treatment assigned to such types of the diseases of which it is the hybrid—of measles and of scarlet fever—should guide the physician in his treatment of this mixed malady. When the disease is mild, then our means should also be mild, and be directed chiefly to the promotion of the secretions and excretions, and consist chiefly of cooling diaphoretics and aperients, and of diuretics; avoiding at the same time all causes, both intrinsic and extrinsic, that may

favour the supervention of internal complications or of unfavourable sequelæ, and restoring and promoting the functions of the skin by external warmth and other means which circumstances may require. When the type of the disease is truly inflammatory, then antiphlogistic measures should be prescribed, but with the recollection that, however inflammatory it may appear, it is generally characterized by more or less asthenia, and by an obviously morbid state of the blood, pathological conditions requiring much circumspection as well as decision in the choice and administration of our means of cure. If, on the other hand, the disease assumes adynamic, nervous, septic, or putrid characters—features of more or less malignity—as observed in some of the epidemics which have appeared on the Continent, remedies of a tonic, restorative, astringent, stimulant, antiseptic, or alterative nature should be prescribed; combining, varying, or adapting each and several of these to the pathological conditions of individual cases, as I have attempted to illustrate when discussing the treatment of MEASLES and of SCARLET FEVER.

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RUMINATION.—SYNON.—*Ruminatio humana*; *Human rumination*; *Merycismus* (μυρικήσις, ruminatio); *Mérycisme*, Fr. Das Wiederkäuen, Germ.

CLASSIF.—I. CLASS, I. ORDER (Author).

1. DEFIN.—The regurgitation of food which had passed into the stomach, and which is remasticated and again swallowed.

2. This affection is of rare occurrence, especially in a simple and complete form. It is much less rare as an occasional, incomplete, and associated occurrence, and in alliance with some form or other of dyspepsia.

3. I. HISTORY OF.—It is difficult to determine whether or not this affection—for it may not be called a disease, seeing that it is attended by considerable enjoyment—was known to the ancients. When we consider the habits and luxurious indulgences of the civilized and wealthy

among the Greeks and Romans, and the means which the most notorious gourmands, in their respective eras of luxury, employed to unload the stomach in order that a second gratification of the palate should be entered upon, it may be inferred that this affection would have been viewed as a source of supreme gratification, and as one to be indulged in or cultivated, and not one to be got rid of. And probably the enjoyment would not have been marred even if a similar opinion had been entertained by their physicians to that promulgated by honest FABRICIUS AB AQUAPENDENTE, who believed that the human subjects of this affection are endowed with a double stomach, and that other bestial endowments might, in process of time, appear in them or in their descendants.

4. GALEN must have had ample opportunities of observation among the cases of indigestion he could not fail of having met with in the luxurious but peaceful court of the ANTONINES, yet he does not furnish us with a single instance of rumination; and amid the various stomach-aches and affections of MARCUS AURELIUS, which both puzzled the brain and caused the anxiety of this immortal physician to such a degree as to make him afraid that a glass of spiced wine might be too hazardous a remedy for the good emperor, the faculty of regurgitating his food for a second mastication appears not to have entered into the number; unless we suppose that, this not being considered a disease, the interference of GALEN was not required, upon the ground that matters of taste, in the animal as well as in the mental application of the word, give a heightened enjoyment by their deliberate rumination.

5. FABRICIUS has furnished two of the earliest instances of human rumination on record. The first was that of a nobleman, in whom it generally took place an hour after his meals, which, whether solid or fluid, were always returned to undergo a second and more deliberate mastication. FABRICIUS has thought it just to mention that the father of this person had a horn growing from his forehead; and with great good faith has added, "*ex quo forte datur nobis intelligi, parentis semen aliquam habuisse cum cornuigeris animalibus, neque mirum fuisse genitum filium simile, quid a parente contraxisse*"—that, although the son did not inherit his father's horns, yet he possessed the accompanying faculty of rumination.

6. The second instance with which honest FABRICIUS has favoured us was in a monk, who, although possessed of a most ravenous appetite, died of marasmus. This monk combined the bestial attributes of both the father and son just mentioned; for, in addition to his faculty of rumination, he had his forehead adorned with two horns, which, in a monk, he avers was the more singular. JOHN BURGOWER, who visited this monk in the company of JOSEPH PREVOT and THOMAS MINADOUS, wrote a volume on this very illustrious person, and furnished FABRICIUS with the particulars which are inserted in his works. BURGOWER also adds that the brother of this monk was also adorned with two budding horns, "*duorum cornuum vestigia gestasse*," as a striking feature of family likeness; or, as this author will have it, "*quod enim fratris erat, id monacho ruminanti simul gratis impertiant.*" But this interesting

individual did not ruminate, unhappily for the argument of THOMAS BARTHOLIN, who, from these two instances, has hastened to the conclusion, with true medical logic, and with faithful dependence upon the obvious analogy of the "*cornuigeræ pecudes*," that all human ruminants are adorned with horns; and has also averred, with equal truth, that they will be found, on dissection, to be possessed of a double stomach. This interesting doctrine cost the laborious CONRAD PYER no small trouble to refute; and he has concluded, in his turn, taking his honour to witness (for he has treated the subject with great gravity) that this did not agree with his experience, for there are many horned individuals who do not ruminate.

7. DANIEL SENNERT has furnished an account of a man of forty who possessed the ruminating faculty from a child. He found no difficulty in accounting for the existence of this affection in that instance, when he learned that this individual, when an infant, had lost his mother, and been fed during his nonage with the milk warm from a cow. SENNERT accordingly, more soberly than legitimately, concludes, that he sucked it in with his nurse's milk: "*Quamobrem deficientes educatione, cum orbis infans, et institutionis humanæ inops nutricum vaccam observaverit tuereturque attentius, ipse ruminationi paulatim assuevit, sodalitiis familiaritate degenerans*!" &c. PHILIP SALMUTH has adduced a case of human rumination which he observed, and stated a fact illustrative of its cause, that is met with in most human ruminants. The subject of the affection ate ravenously, swallowed his food after very imperfect mastication, and ruminated about a quarter of an hour after leaving table.

8. JOSEPH FABER LYNCEUS has immortalized the highly respectable ANTHONY RECCHI, who, dinner being concluded, and seated over his cups with his friends, was always obliged to retire, about half an hour after the meal, into a remote corner of the apartment, and there ruminated the ingesta, undisturbedly, and as quickly as possible; which having done, he enjoyed uninterruptedly the society of his friends. "Having been asked how he became obliged to indulge this propensity, he answered that from a boy he had been subject to acid eructations; and that, after having reached his thirtieth year, he found it impossible to resist admitting into his mouth the food that constantly regurgitated from his stomach. Being farther interrogated whether the second mastication of his food afforded him any gratification, 'Indeed,' he replied, 'it is sweeter than honey, and accompanied with a more delightful relish.' This affection might be said to have been in the family of the distinguished RECCHI; for he was blessed with two grown sons, the elder of whom was also endowed with this delightful faculty, but had it more under control than the father, as he could prevent it altogether when in company. The younger son had not then come to its possession."

9. G. H. VELSCH has recorded the case of an inhabitant of London, who, in the fortieth year of his age, and of sound health, always returned his food to undergo a more deliberate mastication. Rumination always took place in this person from one to two hours after a meal; and even at the second hour it still preserved

a pleasant taste, and was without any degree of acidity. This, however, was not the case with a young woman seen by DANIEL LUDOVIC, for she returned her food with insufficient pleasure, and the regurgitated matters were often possessed of a disagreeable taste. He states that bitters and stomachic purgatives did not remove this affection, which, however, was not always regular in its occurrence; and although emetics and cathartics prevented it for a short time, it soon returned. With all due respect for DANIEL LUDOVIC, I consider this affection more allied to apepsy than to rumination, or as a state intermediate between them.

10. JOSEPH CONRAD PYER has recorded three cases of this affection, one of the subjects of which was idiotic, one was a female, and the three were rustics; and he sagely endeavours to prove, from the circumstance of these persons having been rustics and cowherds, that the frequent sight of the ruminating process had impressed their brains with a similar propensity, which, although at first imperceptible, had nevertheless ripened into maturity. SLARE has recorded, in the *Philosophical Transactions*, at a time when the Royal Society was less fastidious as to the publication of papers, the case of a Bristol man who ruminated not only the more solid ingesta, but also fluids, as milk and soups. But, amid such imperfect information as philosophers in those days were quite satisfied with, I find it stated that his victuals always seemed to descend imperfectly into the stomach, and to lie in the lower part of the throat. However, the portion first taken was the first ruminated. Nevertheless, I suspect that this case was one of sacculated œsophagus, similar to those which have been more recently published by my friend WORTHINGTON and others.

11. More recently, several cases of human rumination have been recorded by MM. TARRES, PERCY, LAURENT, CULLERIER, and still more recently by M. RICHE, SCHMIDTMANN, and myself. The first case which came under my observation was treated in 1819 and 1820, and the history of it fully detailed in the forty-fifth volume of the *London and Physical Journal*. The subject of it is still (1848) alive and in good health. Since the publication of that case, two others, one of them in a medical man, have been treated by me; and I have had reason to believe that instances of partial or occasional rumination are not so rare in the human subject as is generally supposed.

12. II. SYMPTOMS.—The cases of this affection which I have seen were of several years' duration before they came under my care. The affection was stated to have been partial or occasional at first, and had become more constant and complete by neglect and indulgence, and by the habit of quick or voracious eating. The symptoms of the fully developed case, which continued for some time under my care, were as follows: The patient was a married man of about twenty-seven or twenty-eight years of age. Rumination took place after all his principal meals. His appetite was always good, and his food was taken in large mouthfuls, was masticated hastily and imperfectly, and swallowed eagerly, chiefly in order to resume his avocations. There was no thirst. His bowels were habitually costive. His sleep was sound.

13. Usually rumination commenced from a quarter of an hour to an hour after a meal. At its commencement, a sense of fullness was felt at the cardia, followed by a fuller inspiration than usual. As soon as inspiration was completed, a bolus of the unchanged food rose rapidly from the stomach, during the expiratory act, or preceding this act; and so rapidly did expiration succeed to regurgitation of the alimentary bolus, that the latter appeared as part of the expiratory act. The ruminating process was never accompanied at any time with any degree of nausea, nor with pain or disagreeable sensation. The returned alimentary bolus was attended by no unpleasant flavour, was in no degree acidulous, was equally agreeable, and was masticated with greater pleasure and much more deliberately than when first taken.

14. The whole of the food taken at any one meal was not thus returned for remastication, only the part which had undergone this process insufficiently, and which often constituted the greater part of the aliment. That taken at the commencement of a meal was generally first disgorged; but this order was sometimes not observed, much depending upon the articles partaken of, and their comparative degrees of comminution and digestibility. The more fluid portions of a meal were not always returned unless along with the more solid or imperfectly masticated parts; and it was often then observed, if a considerable time had elapsed from their deglutition, that the former was more or less acid, while the latter possessed the same taste and flavour as when first swallowed. When the stomach was distended suddenly by a large meal, the fluid as well as the more solid contents were generally regurgitated, and again swallowed after more or less mastication.

15. In this case, as well as in the others, this affection appeared to have been partially under the control of the will; for, although it sometimes took place when the mind was merely unconscious of the process, yet it never occurred when the individual was sound asleep. If sleep supervened soon after a meal, either it was broken by the occurrence of the ruminating process, or it prevented this process, particularly if it continued for some time. In this latter case, acid eructations, flatulence, &c., took place, owing to the gastric juices being insufficient for the imperfectly masticated ingesta. Sometimes, when the ruminating process was thus prevented, or voluntarily suppressed, the ingesta were not returned until after some hours; but were then acid, often acid and bitter, and were occasionally regurgitated in so large a quantity as to fill, or even more than fill, the mouth. This, however, was unattended by cardialgia, or gastrodynia, or by any feeling of nausea; and even these disgorged matters were attempted to be remasticated, although more generally thrown out on account of their disagreeable taste. In a case related by M. CULLERIER, the subject of it ruminated only when he was urgently pressed by his occupations, and ate his meals in a few minutes, with little mastication. On becoming more at leisure, and being able to pass an hour at table, he ceased to ruminate. Human rumination is to a certain degree an involuntary act, and yet the individual has certainly the pow-

er of hastening or suspending it to a certain extent.*

16. *Dissections* have not thrown any light on this affection. Nor can it be expected that, even in the event of sudden death taking place in a ruminating subject, any very manifest alteration of structure would be found. FABRICIUS and BARTHOLINUS were confident of finding two stomachs at least in ruminating persons, from the analogy of the cornuted animals! PYER and MORGAGNI justly ridiculed the idea, and argued that there were animals which ruminated without a double stomach. The first instance in which inspection after death was made was in the case of the monk already alluded to. It was made by FRANCIS PLAZZONI, and is related by RHODIUS and BONET, the former of whom states: "Monachus cum voluptate cibum ruminavit. Medici brutorum more genuino ventriculo prædium putabant. Ipso defuncto, F. PLAZZONI œsophagum reperit undique carnosum instar musculi, reliquis universi corporis partibus se recte habentibus." The physicians of the seventeenth century were not much enlightened by the opening of this monk, but their dreams of the existence of two stomachs were henceforth dissipated. J. P. FRANK mentions the case of an old hypochondriacal pharmacist who ruminated for forty years. He died greatly emaciated, and on dissection the pancreas was found scirrhus. In a case noticed by BONET, the only change observed after death was the very great size of the stomach and the rough or corrugated state of its villous surface.

17. III. CAUSES.—The predisposing causes of this affection in man are manifestly debility of the stomach with increased organic sensibility, and an insufficient secretion of the gastric juices for the quantity and state of the ingesta. The exciting cause is manifestly an imperfectly divided and insufficiently masticated and insalivated condition of the more solid food, together with a too rapid distention of the stomach. Probably the former would be insufficient to excite the affection without the latter, otherwise the numerous persons who are incapable sufficiently to masticate their food, owing to the state or the want of their teeth, would be much more liable to this disorder than we find to be the case. It is not unlikely that more depends upon the state of the organic sensibility and contractility of the stomach, especially at its cardiac opening, than upon the other conditions singly now mentioned. It is most probable that, as the more digested and digestible matters are propelled towards the pylorus, the least divided or masticated aliments irritate the cardia, and thus, by a reflex action, originating in the stomach, or rather in this region of the stomach only, regurgitate or propel a portion of the unmasticated contents upward and along the œsophagus to the mouth, for

their better preparation. As digestion commences and proceeds and the stomach contracts, the chyme or more altered parts are propelled to the pylorus, and the least prepared or least soluble parts are thereby placed nearer the cardia, whence they are simply regurgitated and remasticated, or where they occasion, according to the states of the organ, or the states of their preparation in the mouth, or their nature, if not rumination, partial or complete, acrid eructations or cardialgia, or any other form of indigestion.

18. IV. TREATMENT.—This affection should be treated simply as a form of indigestion, due attention being paid to the state of the biliary secretions, and, indeed, to all the secretions and excretions. But the means of cure will frequently fail if the patient neglect to take his meals deliberately, and masticate his food sufficiently, or if he take more than his digestive powers can duly dispose of. In the cases which occurred in my practice, a grain of ipecacuanha, with a sufficient quantity of the pilula aloës cum myrrha, or of the extractum aloës purif., to preserve the bowels open, was given twice daily, and a tonic draught about an hour before dinner; or only the pills prescribed in the Appendix (*Form* 558). These were aided by warm salt-water bathing, followed by frictions of the surface; by cold sea-bathing, or the cold shower-bath; by attention to diet, by eating in moderation, and by masticating deliberately. In other respects, and according to the associations which this affection may present in practice, the treatment is altogether the same as is recommended in the article INDIGESTION.*

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* [Three cases of this rare affection have come under our knowledge, one of which was connected with a sacculated œsophagus. The others corresponded exactly with the cases above described, the food having been returned to the mouth a short time after eating, when it was remasticated and reswallowed without farther difficulty. The habit, for it was partly, at least, a voluntary act, seemed to have been brought on, in both cases, by swallowing the food hastily and without chewing. There was no cardialgia or nausea, nor was there any gastrodynia in either case.]

* SAUVAGES adduces an interesting case of human rumination which occurred in a rustic, who accelerated and promoted the ruminating process, or, rather, the regurgitation of his food for remastication, by pressure over the stomach. After thus promoting at will this process, and resorting to it for several years without any detriment to his health, his confessor admonished him against it. But rumination continuing, notwithstanding the means employed to promote it were laid aside, he was told to reject the regurgitated food. He did so for a fortnight, but he became so debilitated that he had recourse to medical aid. His physician advised him to instantly re-swallow the substances which were regurgitated, without submitting them to a second mastication, and prescribed for him tonics, stomachics, and aperients, and after a few days he was freed from his rumination and all his ailments.

Dict. des Sciences Médicales, t. xxxii., p. 526, 8vo. Paris, 1829.—*Toggia*, Della Ruminazione e Digestione del Ruminante, 8vo. Torino, 1819.—*J. Copland*, History of a Case of Human Ruminatio, with an inquiry into the nature of the process, and into some of the Phenomena of Digestion; and with an historical relation of similar affections, in Lond. Med. and Physical Journ., vol. xlv., p. 362, 8vo, 1821.—*L. J. Schmidmaun*, Summa Observationum Medicarum ex Praxi Clinica Triginta Annorum deprimarum, &c., vol. iii., cap. viii., p. 182. Berol., 1826.—*M. Riche*, in Archives Génér. de Médecine, t. xvii., p. 266.

RUPIA.—SYNON.—*Ulcus atonicum*, *Ecephylis Rhyppia* (Good). *Rhypparia*; *Rupia* (from *ῥῦπος*, filth). *Phlyzacia*, Alibert. *Atonic ulcer*.

CLASSIF.—Order 6th. Vesicular eruptions. Genus 4th. Offensive vesicular eruption (Willan and Bateman). IV. CLASS, IV. ORDER (Author).

1. DEFIN.—*An eruption of small, flattened, and distinct bullæ, surrounded by inflamed areolæ, filled with a serous, puriform, sanious, or dark bloody fluid, and followed by thick, prominent, dark-coloured scabs, covering unhealthy ulcers.*

2. I. DESCRIPTION.—This eruption is observed chiefly in delicate, debilitated, or cachectic constitutions. It is so closely allied to *Pemphigus* as to justify the arrangement of both as species of the same genus. Most of the recent writers on diseases of the skin have described three varieties of rupia, namely, *R. simplex*, *R. prominens*, and *R. escharotica*.

3. i. *Rupia simplex* commonly appears on the legs, sometimes on the loins or thighs, and seldom on other parts. It commences with one or more flattened, isolated bullæ, varying from the size of a sixpence to that of a shilling, that contain at first a transparent serous fluid, which soon becomes turbid and purulent. This fluid grows consistent, and is finally changed into scabs of a chocolate colour, thicker in their centres than in their circumferences, the outer layer being continuous with the epidermis, which appears detached at the margins by the fluid underneath. Under the scabs, which are detached within a few days, the skin is found excoriated or ulcerated superficially. The sore, if left to itself, either heals up, or is more frequently covered by another scab, which is thrown off at a later period; and thus the process may be repeated for several times. When the ulcer heals, the part retains, for a very long time, a livid or deep red hue.

4. ii. *Rupia prominens* presents larger bullæ than the preceding, and the scales are thicker, and the ulceration underneath is deeper. Each bulla is preceded by a circular red spot, over which the cuticle is detached and slowly raised by a dark thick fluid, which soon concretes into a scab, the thickness and size of which increase for some days afterward. The circumference of the scab is surrounded by a reddish border, a few lines in breadth, the epidermis of which is raised by a serous fluid, which forms a new incrustation, adding to the extent of that already produced. The areolæ also increases in breadth around the base of the scab, which itself increases in breadth and thickness during three or four, or even during seven or eight days. When the diameter of the scale is large it resembles the outer surface of the convex shell of an oyster; but in this variety the incrustation projects in the same degree as it spreads, becomes conical, and resembles the shell of a limpet. The scab adheres firmly, and generally requires emollient applications to fa-

cilitate its removal. When it is removed, the surface underneath the scab appears ulcerated more or less in extent and depth. If the part remain exposed to the air, either a new crust or scab is formed, or ulceration extends more deeply and spreads until it approaches the breadth of a half-crown or crown-piece. The ulcerated surface is pale and readily bleeds. The atonic ulcers thus produced heal very slowly; and the cicatrices which they leave retain for a long time a brownish livid hue, and are liable to break open afresh.

5. iii. *Rupia escharotica* occurs chiefly in cachectic children and infants, and occasionally in aged persons, or in adults who have suffered severely from chronic rheumatism or constitutional syphilis. It commonly appears on the legs, the thighs, the scrotum, the abdomen, the upper part of the chest and neck, but it rarely is seen on the upper extremities. This variety, in infants, is almost, if not altogether, identical with *pemphigus infantilis* (see PEMPHIGUS, § 9). It begins by one or two red and livid spots, over which the cuticle is soon raised, by the effusion underneath it, of a serous or sero-sanguinolent fluid. The bullæ thus formed go on increasing in an irregular manner; the serum they contain becomes turbid, and of a blackish hue; they afterward break, and the dermis, left exposed, appears ulcerated, softened or gangrenous in different points. A bloody and an offensive sanies bathes the surface of the sore, the edges of which are livid, but not very painful. In infants the bullæ do not generally reach so large a size as those in adults, but they follow each other in greater numbers; the sores becoming painful, causing fever and sleeplessness, and even fatal exhaustion in the course of two or three weeks. In adults, this variety sometimes acquire the dimensions of rupia prominens, and small portions of skin and cellular substance often spheclate, and are detached slowly from the ulcerated surfaces. In every instance cicatrization is tardy, restoration being often arrested or stationary for a time. This variety is always attended by marked constitutional disturbance.

6. *Rupia* is sometimes complicated. *R. simplex* is frequently associated with *ecthyma*, or with *scabies*. The other varieties are occasionally complicated with *purpura*, or with the cachexia produced by very chronic rheumatism, by constitutional syphilis, and by long-neglected disorder of the digestive, assimilating, and excreting organs.

7. II. DIAGNOSIS.—*Rupia* can be confounded only with *ecthyma* and *pemphigus*.—(a) *Ecthyma* differs from rupia in being a pustular eruption from its first appearance. The highly inflamed areolæ surrounding the pustules, and the hardness, small size, the embedded position, and the closer adherence of the scabs, farther distinguish *ecthyma*.—(b) *Rupia* is distinguished from *pemphigus* by the smaller size and flatness of the bullæ; by the turbid and sanguinolent contents, as contrasted with the usually limpid and transparent fluid of *pemphigus*; by the thick, rugous, and imbricated scabs; and by the ulcerations of various extent and depth.

8. III. CAUSES.—Scrofulous children, the offspring of debilitated, drunken, or dissipated parents, and persons who have been weakened or exhausted by depressing causes, by sickness,

and unwholesome food, are the most frequently the subjects of this eruption. It appears, especially during the winter, among the insufficiently clothed and fed, and among those who neglect personal cleanliness, and who live in low cellars, or in close, crowded, and ill-ventilated places or apartments. It is also liable to occur during convalescence from small-pox, scarlatina, measles, &c.; and in both young and aged, who are the subjects of some degree of some anæmia in connexion with impaired excretion. Its association with cachexia, especially as an effect of this state of the frame, and of constitutional syphilis, in some other instances, is a circumstance of great importance in forming our intentions, and in selecting our means of cure.

9. IV. PROGNOSIS.—Rupia is not in itself a dangerous, although often an obstinate, and, when the eruption is abundant, a serious disease. When it appears on the legs, the ulcers are always intractable. The duration of rupia cannot be stated with precision; but it is always chronic, and often very protracted; much, however, depends upon the age and constitution of the patient; the number, the size, and the situation of the bullæ; on the states of the consequent sores; upon the character and amount of the constitutional disorder; or of the cachectic taint, or of existing visceral disease when this is present.

10. V. TREATMENT.—The intentions of cure are *first* to improve the state of constitutional power by suitable diet, regimen, and medicines; and *next* to improve the state of the ulcerated parts.—(a) The various remote causes should be removed, and the excreting functions of the skin and the assimilating actions promoted by means of warm, or warm salt-water, or alkaline baths; by a generous, nutritious, and digestible diet; by a fresh, dry air; by tonic decoctions or infusions, as those of cinchona, cascarilla, gentian, absinthium, &c., with alkalis, or with the nitro-muriatic acids; and by the preparations of iron, when indications of anæmia are observed. But while these objects are pursued, the alvine secretions and excretions ought to be promoted by stomachic aperients; or by a combination of mild purgatives with tonics, or vegetable bitters, or other restoratives. If these means should fail, a course of the cod-liver oil should be prescribed, as I have lately found it successful in two obstinate cases. When this eruption appears in children, the health and state of the milk of the nurse require attention. A healthy nurse should be selected for the child, and change of air recommended if this may be accomplished. When rupia occurs during or after weaning, a nutritious and wholesome diet should be prescribed, and asses' milk, diluted, or fresh whey allowed for drink; but change of air, especially to a dry and open situation, or to the sea-coast, ought to be most strenuously insisted upon.

11. (b) The local treatment of rupia consists chiefly of puncturing the bullæ early, and allowing the morbid secretion to escape, and of having recourse to such applications as will exclude the air and restore the healthy action and tone of the vessels of the part. When the scab is formed over the sore, with the natural intention of protecting diseased surface from the action of the air, then the morbid secretion there-

by confined underneath or around the scab perpetuates the irritation, and the healing process is prevented. Hence the necessity of having recourse to such applications as will at the same time exclude the air and restore the healthy state of the parts. The water-dressing, by excluding the air, is beneficial, as well as by allowing the immediate escape of the irritating secretion from the surface of the sore; but it does not restore the tone of the affected vessels. Strappings, insinglass plasters, and similar means, does not allow the escape of the irritating secretion, and hence, if not often renewed, they fail of being of service; but when frequently renewed, after the parts are stimulated by suitable application, they are then very beneficial. Lotions containing the nitrate of silver, or nitric acid, or the bichloride of mercury, or tincture of iodine, or the sulphate of zinc, or alum; or sponging the surface with spirits of turpentine; or ointments containing either of the balsams, especially the balsam of Peru, or one of the turpentine, are generally of service. Biett recommends an ointment containing the proto-ioduret of mercury (3j. to an ounce), or dento-ioduret (gs. xii. to ʒj.). Rayer advises the surface of the ulcers to be dusted with cream of tartar. A cretaceous powder, containing the oxide of zinc, is preferable to this. An ointment consisting of one third or a half part of the unguent. hydrarg. oxido nitricum is often of service.

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SALIVATION.—See *Mercurial Salivation*, and other forms of Salivation in art. Poisons, § 580, et seq.

SCABIES.—See *ITCH*.

SCARLATINA RHEUMATICA.—SYNON.—*Febris Exanthematica articularis*; *Exanthesis Arthrosia*; *Plantaria*; *Dengue*; *Demga*; *Febris peculiaris epidemica*; *Giraffe*, Bouquet, Fr. *Dandy*; *Eruptive articular fever*; *Epidemic eruptive rheumatism*, Cock. *Epidemic anomalous disease*, Stedman. *Peculiar epidemic fever*.

CLASSIF.—III. CLASS, III. ORDER (Author).

1. DEFIN.—*Severe pain commencing suddenly in the small joints, followed by local swellings and chilliness, or shiverings; to these succeed heat of skin, intense pain in the head and eyeballs, which soon become general; and on the third or fourth day a scarlet efflorescence appears on the palms of the hands, spreads rapidly over the body, and continues two or three days, after which the symptoms subside, the malady being infectious and epidemic.*

2. The epidemic fever, which has been variously named, but which may be justly called an *eruptive articular fever*, or *eruptive arthritic fever*, has been somewhat differently described, and probably it has presented modifications with the climate, season, locality, and circumstances in which it appeared, and with the treatment prescribed for it. But wherever it has occurred it has prevailed almost universally, few persons having been exempt from it. It has in every place, however, presented distinct characters, which constitute it a disease *sui generis*—different from others, in combining an exanthematous eruption, ushered in by fever, with

most severe rheumatic or neuralgic symptoms—the course of the malady being so divided by intervals or remissions as often to give rise to the idea of relapses having been a common feature in its progress. The first account of its existence was brought from Rangoon in the East Indies, in May, 1824, and it appeared in Calcutta in June. It extended in various directions to the different presidencies. Dr. MOUTAT states that it prevailed not only in Berhampore, but in many other places in the vicinity, in March, April, and May, 1825. The secretary of the Medical and Physical Society in Calcutta says that it was particularly severe in the populous towns of Patna, Benares, Chunarghur, and numerous other places. Dr. MOUTAT describes it as “an epidemic fever,” which was characterized by “the suddenness of its attack, the redness and watering of the eyes, the acute pain in all the joints, rendered excruciating on the slightest touch, the scarlet or crimson efflorescence on the surface, and its sparing neither age, sex, nor habit of body.” The accounts furnished by the East Indian physicians of the symptoms and treatment of this epidemic fever agree in the essential characters, but are desultory and very imperfect in many respects, and are mixed up with speculations, as usual, as to the influence of too much rain or of too little rain, of electrical conditions, of terrestrial emanations, and of other supposititious causes in producing it, while the most obvious and true cause is entirely overlooked. The physicians who have written from their experience of the epidemic in the West Indies and North America, two years after the prevalence of it in the East, have given the fullest account of its symptoms and treatment, but without being acquainted with its previous appearance in the East Indies.

3. This disease made its appearance in the Island of St. Thomas, in the West Indies, in September, 1827, and soon extended to the rest of these islands and to the southern states of America. It advanced westward among the islands during the winter, and spread to the ports on the Gulf of Mexico. Thence it travelled northward, and reached New Orleans in the ensuing spring. During the summer Savannah and Charleston were severely visited by it. A few cases of it appeared in Philadelphia and New York; but it did not extend farther north. It has been described by the several writers referred to hereafter, but with much difference in many particulars; and it does not clearly appear whether or no the difference was owing to the influence of climate and locality, or to the treatment adopted by the writers. Dr. STEDMAN, who practised in the Island of St. Thomas, where it first appeared, and Dr. DICKSON of Charleston, have given good descriptions of it. The former states that, of a population of 12,000 in the principal town of St. Thomas, scarcely one escaped. It appeared so suddenly, and spread so rapidly, as to have caused great alarm; but it soon was discovered that although a most painful, it was not a dangerous malady; yet it often left much suffering, and even disease, after the decline of the more severe symptoms.

4. I. DESCRIPTION.—Dr. STEDMAN divides the course of the disease into *three stages*.—(a) In the *first*, the invasion was somewhat different

in different cases. Usually a person in perfect health was suddenly affected with stiffness and pain in one finger, commonly the little finger. The stiffness and pain increased and extended up the hand, along the arm to the shoulder. The fingers of both hands became swollen, stiff, and very painful, and incapable of being bent. Sometimes the affection commenced in the lower extremities, always in the small joints, and extending to the large, and to the trunk. These symptoms were followed in a short time by restlessness, depression of spirits, by nausea, in some cases by vomiting, and by chilliness or shivering. But Dr. DICKSON states that shivering was either slight or wanting in the disease, as it prevailed in Charleston. To these succeeded fever, with great heat of skin, intense headache, acute pain in the back, knees, ankles, and in every joint, with violent pain in the eyeballs, which felt to the patient as too large for their sockets. In some cases, while the extremities were cold at first, the rest of the body was intensely hot. As the fever and heat of skin were developed, the whole body, particularly the head, eyes, back, and joints, was racked with pain. In some the features were swollen and distorted, especially the eyelids; in others, with swelling of the face and distortion of the fingers, soreness of the mouth, or pyalism occurred. Patients often complained in this stage, as well as in those which followed, of a feeling of great cold, even when the skin was very hot to the touch. When Dr. STEDMAN had the disease, he covered himself with three blankets, although the weather was sultry at the time. The severe pains, restlessness, and nausea rendered this stage the most distressing of any form of fever excepting rheumatic fever. These symptoms generally continued with more or less severity for twenty-four or thirty-six hours. The fever then abated, and with it also the pains. The patient, however, continued in a state of languor, irritability, and restlessness for three days, but without fever; and generally without hunger, thirst, and altogether without taste, the tongue being loaded, and the mouth presenting small aphthous sores. The pulse was in this stage much accelerated, the urine high coloured, and the bowels confined.

5. (b) The *second or eruptive stage* commenced the third or fourth day after the primary fever, generally the third, with a return of fever, and with an efflorescence which appeared on the hands and feet, and rapidly spread over the body. This eruption is differently described, both as to its characters and time of appearance, and probably it was modified in different cases; but in this, as in other respects, the descriptions are loose, devoid of scientific precision, and by no means creditable to the writers. Dr. STEDMAN describes the eruption as that of “a blotch or wheal of red-coloured skin, between that of scarlet fever and that of measles.” Others state the eruption to resemble that of scarlet fever; others that of measles; some that of roseola or erythema; and some the nettle-rash. It was attended, “in the severer cases, by swelling of the feet, hands, and face, particularly the eyelids, and by a distressing tingling, which, as the eruption disappeared, became an intense itching. The efflorescence generally began to fade on the second day, and

was entirely gone before the third morning of its existence. This was followed in almost every case by some degree of desquamation," which, in a few instances, gave rise to troublesome consequences. After this eruptive stage, many patients began to recover their spirits and strength, a complete want of taste often remaining for some days; but many patients also became subject to the next stage.

6. (c) *The third, or rheumatic stage*, sometimes immediately followed the eruptive stage, but often not until one, two, three, or four weeks, or more had elapsed; and however early or late it appeared, it was generally of considerable duration, the pains and paralysis being greater than at first. "These pains were not accompanied with fever; and they generally fixed themselves in one or two joints, and continued to excruciate the patient for weeks." They were always severest in the morning, and wore off in some degree towards evening. Some were tormented, in addition, by most distressing itching of the skin; and in others the joints, particularly those of the fingers, were painful, stiff, and swollen so as to produce deformity. The secondary pains were chiefly in the fingers, toes, wrists, ankles, and knees; confined persons to their beds, and were so aggravated, on motion, as to call forth groans and shrieks from those who suffered this stage severely. Except these pains, and the irritation they occasioned, "no other symptom of disease remained; the appetite was good, although the sense of taste was blunted." "In a period varying from three to four, or six days, the pains began gradually to subside, deserting one joint after another until they remained fixed for some time in one. This process occupied several weeks, and was often attended by relapses." This description, however, applies only to the severest form of the malady, endless grades of severity, as well as differences in the stages, having been observed; "for while some, who underwent the primary fever with the utmost mildness, had the eruptive attack with great violence, others, who had passed gently through both, and were congratulating themselves on their escape, were suddenly crippled by the secondary pains." It was remarked that those whose unavoidable occupations forced them to exertion, or who had resolution enough to exert themselves, got sooner rid of the pains than those who gave way to them.

7. (d) *The differences or modifications* mentioned by those who have described the disease were numerous. Dr. STEDMAN remarks that the negroes were much less severely attacked than the white inhabitants; and yet the only three fatal cases which occurred in the island were negroes. Dr. DICKSON, of Charleston, states that excessive determination of blood to the head was frequent, and that delirium was present in several instances; but that it went off with the fever of the first stage, which did not remit, but subsided in a short time—on an average, in about thirty-six hours. The skin at this stage was at first hot and dry; but an abundant perspiration was thrown out, attended occasionally by a rash or miliary eruption. This eruption appearing in the first stage (not the characteristic eruption), was very various, and not the regular or true one. Children were often thus affected by it, and in several adults

a thick crop of pimples was the first token of disorder. On the third or fourth day, little or no fever being present, the tongue became coated with a yellowish fur; the stomach uneasy or distressed; the patient low-spirited, impatient, fretful, and restless at night. Frequently there were great lassitude and debility, nausea, vomiting, and a distressing feeling of oppression. About the sixth day of the disease "these symptoms were more or less relieved by the coming out of an abundant eruption, which must be regarded as an essential or characteristic part of the malady. It consisted of irregularly-shaped patches, red and elevated; the feet and hands swelling with thickening and numbness. There were much itching and burning of the skin, and at this period a second febrile paroxysm often came on; and the pains of the joints were in many aggravated to their former severity." In some cases the first stage of the disease had passed over with very little notice or complaint, and yet in them this eruptive or second stage was very violent. "Many became sensible, on the third or fourth day, of an inflammation and enlargement of the glands in the groin, axilla, neck, &c., and these glands continued swollen and painful a long time after convalescence was established.

8. Very young *children* were liable to the disease, even from a few days after birth: some were supposed to be born with it. In these the skin was of a scarlet red, and the tongue and lips smooth and fiery. The infant could not bear to be disturbed; it screamed violently when lifted or when any of its limbs were moved. Below five years of age convulsions very commonly attended the invasion, and sometimes continued with great frequency throughout the whole of the attack. *Pregnant women* were very liable to abortion, instances of miscarriage having been numerous. They were usually seized at the very commencement with violent pains in the back and loins, extending into the thighs, occasioning the expulsion of the fœtus. In old persons the disease occasioned excessive prostration of strength; and in several of these it left behind it an erysipelatous inflammation of one or both legs. There was often soreness of the mouth; looseness, lividness, and sponginess of the gums, with slight salivation. Ulcers sometimes formed in the mouth, which were occasionally painful, irritable, and difficult to heal. Very few died in Charleston; but the aged, the intemperate, and corpulent were severely shaken by the malady, and remained long debilitated and emaciated; few persons above the age of sixty had absolutely recovered from it after two or three months from the attack.

9. II. CAUSES.—Nearly all who observed this epidemic in the Western hemisphere have considered it infectious. Drs. STEDMAN and DICKSON, who have given the fullest account of it, concur in this opinion. The introduction of the disease from one island to another, and the propagation of it from persons and places to others, were so frequently and so incontrovertibly proved, that no doubt as to the fact of its infectious nature was entertained. But how did it originate? for there was nothing in the medical topography, the season, the weather, or the climate of St. Thomas, where it first appeared, in the West Indies, to account for the occurrence. Dr. STEDMAN states, in his very dis-

jointed, although tolerably full account of the epidemic, that it was supposed to have been brought to the island by a vessel from the coast of Africa, but that this fact was not satisfactorily ascertained; nor, indeed, does it appear that any trouble was taken to determine the matter. Dr. Dickson states that the disease was imported into Charleston by the captain of a ship who brought it from the Havana and communicated it to his family, and that the transmission of the disease was traced from one subject to another. Dr. D. considered it a contagious eruptive fever, and remarked that in a few cases in which the eruption in the second stage did not take place, the patient was liable to a second, third, and an indefinite number of returns of the disease, while those "*who were properly covered with the eruption about the sixth day were protected from any future attack.*" He states this to have been a rule to which there was no exception in his practice, and that this protection had particularly attracted his attention.

10. III. NATURE.—The descriptions which have been given of this disease show it to have been an infectious eruptive fever, *sui generis*, attended by severe arthritic, or rheumatic, or neuralgic pains, to which all were predisposed who were not protected by a previous attack. In this it agreed with scarlet fever, measles, small-pox, &c.; and with these diseases it also agreed in its specific eruption appearing at a definite stage of its progress. The eruption itself has not been described with precision; but it appeared to have more closely resembled that of scarlet fever than any other, or to have been intermediate between it and measles. It appeared to have consisted of large scarlet blotches, which were smooth and slightly elevated, owing to the congestion of the minute sub-cuticular vessels, and which terminated in desquamation. The violent articular pains, swelling, and stiffness were evidently results of a remarkable alteration of the organic sensibility, with a consequent change of the capillary circulation in the synovial and other tissues of the joints, as well as in the vascular rete of the skin. While the cutaneous eruption, occurring at a certain period, and continuing only a short time, entitles the disease to rank among the exanthemata, the painful state of the joints imparts to it the rheumatic character. That it was not a form of scarlet fever is shown by the severity of the rheumatic or neuralgic symptoms; by its having attacked persons who had previously had scarlet fever; by the absence of the nephritic disease and dropsy so often consequent upon scarlet fever, as well as of the internal affection so frequently complicating this fever. That it was not a rheumatic fever was shown by the undoubted propagation of it by infection, by the character and time of the appearance of the eruption, by the course of the disease, by the absence of any cardiac or other internal complication, and by the protection which a full evolution of the eruption afforded from a second attack. Dr. Dickson doubts that this was a new disease, and believes it to have resembled a form of remittent fever observed and described by Dr. Rush in 1780; but the differences between them are too remarkable to admit of any resemblance, and he was unacquainted with the accounts of the prevalence

of the epidemic in the East, contained in the Transactions of the Medical and Physical Society of Calcutta. According to these accounts, as well as to those given of it in America, the disease appears to have possessed an asthenic character; as those who were bled, especially in large quantity, were long in recovery, although a moderate bleeding was beneficial in the plethoric or those lately arrived from Europe; and it seemed to have pursued the usual course, particularly as respected the first and second stages, whatever means were used—to have been incapable, like the other exanthemata, of being cut short by any treatment, however much its violence was mitigated—a mitigation which was best accomplished by an emetic, followed by mild purgatives and diaphoretics. The very few deaths which occurred during this epidemic appeared to have arisen either from pre-existent organic lesion, or from some coincident or intercurrent disease produced by its usual causes, and presenting no necessary connexion with this malady.

11. IV. TREATMENT.—Dr. STEDMAN states that the first cases which appeared at St. Thomas were so mild that he prescribed only purgatives, the warm bath, pediluvium, and diaphoretics. When the pains were severe patients refused purgatives, owing to the distress occasioned by the least motion. As the cases became more severe in the course of the epidemic, he had recourse to blood-letting during the establishment of the febrile excitement of the first stage, taking away from twelve to twenty ounces, but never more, nor ever repeating the operation. After bleeding and purging, he gave Dover's powder at bed-time. During the eruption he gave cooling aperients and cooling beverages, and prescribed the usual washes for the soreness of the mouth. Dr. Cock adopted a similar plan of treatment to that of Dr. STEDMAN. Dr. DICKSON states that he, as well as others, at first prescribed bleeding, purgatives, and warm diaphoretics; but the great severity of the pains induced him to give large doses of opium, and the relief and success following the practice induced him to persist in it and to relinquish blood-letting, as he believed that not only was the vital fluid thus husbanded, but the subsequent sufferings were lessened in severity and duration. He considered that, beyond the preservation of an open state of the bowels, cathartics effected very little benefit, and that an emetic was less objectionable, but was in most instances unnecessary. In addition to a free recourse to opium, he employed camphor, ether, and sinapisms externally. Restoratives appeared to have been required at an advanced stage of the disease, especially in aged and delicate persons.

12. In the East Indies, the softness of the pulse and the general depression deterred many medical men from bleeding from a vein; but some had recourse to the application of leeches, and others considered that bleeding in any form was prejudicial. The most successful practice appears to have consisted of the administration of an active emetic, followed by purgatives, so as to freely evacuate the bowels; and these by opiates or anodynes with diaphoretics; restoratives and tonics having been given after the subsidence of the eruption of the second stage.

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SCARLET FEVER. — SYNON. — *Scarlatina* (from the Italian, *Scarlatto*, scarlet, a deep red), Sauvages, Vogel, Juncker, Cullen, J. P. Frank. *Morbili confluentes*, *M. ignei*; *Rubeola conflens*; *Febris purpurata*; *Rosalia*, *Rossalia*, *R. squamosa*, Auct. *Morbus scarlatinosus*; *Febris scarlatinosa*; *Febris scarlatina*, Sydenham. *Purpura scarlatina*, Burserius. *Guttes morbus epidemicus Foresti*; *Febris rubra*, Heberden. *Typhus scarlatinus*, Crichton. *Typhus scarlatina*, Young. *Exanthesis rosalia*, Good. *Febris scarlatino-miliaria anginosa*; *Porphyrimus*; *Porphyrisma*, Plouquet. *Fièvre rouge*, *F. pourprée*, Fr. *Scharlach*, *Scharlachfieber*, *Scharluchkrankheit*, *Scharlachanschlag*, Germ. *Scarlatina*, Ital. *Scarlet fever*, *Rash fever*.

CLASSIF. — 1st CLASS, Febrile Diseases.

3d Order, Eruptive Fevers (Cullen).

3d CLASS, Diseases of the Sanguineous

Function. 3d Order, Eruptive Fevers

(Good). III. CLASS, III. ORDER (Author in Preface).

1. DEFIN.—An infectious continued fever; on the second day of which, or sometimes later, a scarlet efflorescence generally appears on the fauces and pharynx, and on the face and neck, spreads over the body, and commonly terminates in desquamation from the fifth to the seventh day; the fever being accompanied with affection of the kidneys, often with severe disease of the throat, or of some internal organ, and sometimes followed by dropsy, and occurring only once during life.

2. There is reason to doubt that the Greeks and Romans were acquainted with this disease, and the doubt applies equally to the Arabians, although a few passages in RHazes might support the idea that scarlatina was confounded by the Arabian writers with measles. The first writer who distinguished the disease is stated by HILDENBRAND and J. FRANK to have been INGRASSIAS, who remarks that before the period at which he wrote it was called *Rossalia* or *Rossania*, from *rosso*, red; and that, although it was generally considered as the same malady as measles, yet he was convinced, by his own observations, that the one was different from the other. J. COYTAR, a physician of Poitiers, published an account of an epidemic which prevailed in 1557, having the characters of this malady; and FORESTUS states that the

epidemic at Amsterdam in 1557, described by TRENGIUS, was this malady. According to WIERIUS and SCHENK, this fever appears to have been prevalent in Lower Germany in 1564 and 1565; and BALLONIUS states that it was epidemic in Paris in 1581. DE HEREDIA describes it by the appellation of "*Angina maligna*." The disease which was epidemic in Naples in 1620, and of which accounts were published by CARNEVALA, NOLA, and SGAMBARTI, was probably scarlatina anginosa, which was then variously denominated, but most frequently as "epidemic phlegmonous angina," "a pestilential affection of the fauces," &c., although HILDENBRAND entertains a different opinion. From this period accounts of several epidemics of scarlatina were furnished by writers, the symptoms and characters of which appear to have varied then as in more recent times. D. SENNERT was the first to give a true description of scarlatina, in 1619. Subsequently, WINKLER, in 1642, WELSCH of Leipsic, and SCHULZE in Poland, observed severe epidemics of this malady, and described it by the name of "malignant purpura," by which it was then known. The epidemic described by SYDENHAM, from 1657–73, appears to have been comparatively mild, while that observed by MORTON, from 1672 to 1686, seems to have been much more severe; but he has noticed it as differing from measles, chiefly as respects the character of the eruption. During the eighteenth century this malady became more and more frequent, and the general prevalence and the great fatality of its epidemic visitations roused medical attention to its nature and treatment. STORCH, HUXHAM, STOECK, FOTHERGILL, HEBERDEN, DE HAEN, BICKER, BLACKBURNE, GRANT, SACHSE, KREYSIG, WITHERING, REUSS, and many others have described these visitations. During the early part and middle of that century scarlet fever was variously named, and not only distinguished from other diseases attended by efflorescence, but more especially from measles and roseola. The writings of HEBERDEN and FOTHERGILL in this country were the first to show the distinct nature of this malady; and those of WITHERING placed this fact beyond dispute. At the present day scarlet fever is never absent, either in a sporadic or epidemic form, from any country in Europe, although in different degrees of severity and of prevalence. In warmer countries it appears chiefly as an epidemic, and generally after considerable intervals of immunity from its devastation.*

* [The scarlet fever has prevailed in the United States, at times, from its first settlement. We find it prevailing during a wet, cold season in May, 1735, in New Hampshire, under the name of the "throat distemper," which proved extremely fatal to children. The symptoms were a swelled sore throat, with white or ash-coloured specks, an efflorescence on the skin, great debility of the whole system, and a tendency to putridity. Of the first forty patients attacked it is said not one recovered. Very few children escaped. Although the disease was considered as very infectious, yet it attacked the young in the most sequestered situations, and without a possible communication with the sick. Many families lost three and four children—many lost all. Since that period it has occasionally prevailed as an epidemic in various places all over the country, under the name of "throat distemper," "putrid sore throat," "angina maligna," "scarlet rash," &c., &c. Noah Webster states, "that 'scorbutic people and those who lived on pork, and, of course, the poor, suffered most. In some families it was comparatively

* [A brief History of Epidemic and Pestilential Diseases, &c., 2 vols. Hartford, 1739, vol. I, p. 234.]

3. I. DESCRIPTION OF REGULAR OR NORMAL SCARLATINA.—The *course* of scarlatina has been divided into *three periods*, or stages, by some writers, and into *four* by others; these latter dividing the second stage into two. 1st. That of invasion, or that preceding the eruption; 2d. That of the eruption (comprising the periods of eruption and efflorescence); and, 3d. The stage of desquamation. When scarlet fever proceeds in its more regular or usual course, these periods are generally very distinct; but when it assumes certain varieties, forms, or complications hereafter to be noticed, they are often indistinct, or even not altogether observed.

4. A. The *first stage of regular or normal scarlatina—stadium invasionis, s. irritationis*—is attended by general uneasiness, lassitude, headache, or giddiness; by a sense of depression, and loss of strength. The patient dislikes food, nauseates animal food, and complains of chills, horripilations, shiverings, or rigours. These are succeeded by heat of skin, great acceleration of pulse, by urgent thirst, by increased headache, by pain and redness in the throat, with difficulty of swallowing. The eyes are often red, and intolerant of light. These symptoms are the most constantly observed; but in severer cases nausea, vomiting, violent pain in the head, with aching of the back and limbs; augmented sensibility, sleeplessness, occasionally delirium, or even convulsions, in very young subjects, are also observed. Fever is always present, although often slight, and either exists alone or precedes or accompanies the angina. It is often severe, the pulse being very rapid and full, the skin dry and burning, and the face congested, tumid, or slightly suffused. The redness of the fauces and pharynx is frequently great on the first day, sometimes in the course of a few hours, and the tonsils are swollen. The redness and congestion sometimes extend to the posterior nares, causing a stuffing sensation in the nostrils, and occasionally there is hoarseness. The tongue is covered at its base with a whitish or yellowish coating, is red at its edges and point, and its papillæ are erect or excited. The bowels are costive or irregular; and the urine is scanty, high-coloured, voided frequently, and is sometimes albuminous, or soon afterward presents these characters. In most cases these precursory symptoms continue but one day; in others they are prolonged, the eruption not appearing until the third or even the fourth day: in some the febrile symptoms are either so slight as not to attract attention, or are so instantaneous and brief as to appear as if merely ushering in the angina or efflorescence. The perspiration possesses a peculiar odour, which has been variously described by HEIM and others.

mild; in others it was malignant, like a plague. This disease gradually travelled westward, and was two years in reaching the River Hudson, distant from Kingston, N. H., where it first appeared, about 200 miles in a straight line. It continued its progress westward, with some interruptions, until it spread over the colonies. Few adults were affected: its principal ravages were among persons under age, or, rather, under puberty. For many years after it was epidemic, it frequently broke out in different places, without any apparent cause, but did not spread; a striking proof that such diseases will not become epidemic by the sole power of infection, but that some general cause must aid its propagation, or it will perish in its cradle. This is probably true of every species of pestilential disease"]

5. B. The *second stage* commences with the eruption, which appears generally about the second day—sometimes on the evening or night of the first day, and occasionally not until the third, or even fourth day. The efflorescence appears first on the neck and face, especially the cheeks, the tint of which is commonly deeper than that of other parts of the countenance. Sometimes the chest or trunk, or the extremities, or even the hands and feet, first exhibit the eruption, which extends more or less over the body. The eruption consists of an infinite number of minute red points, which appear in a rose-coloured ground, and are not visibly or sensibly elevated. These points, which are finer, redder, more regular, and more confluent than those of measles, are transformed into patches, which are not elevated, and appear smooth or continuous with the surrounding surface. The patches, at first distinct, enlarge, and thus coalesce; ultimately imparting a scarlet tint to the skin, which disappears momentarily from the pressure of the finger. The skin is now very hot, dry, and somewhat rough to the touch. It is sometimes diffusely tumefied, from the cutaneous and sub-cutaneous congestion, especially in the neck, face, feet, hands, and flexures of the joints, and is often the seat of a disagreeable stinging or pruritus.

6. The redness of the fauces and pharynx, and the swelling of the tonsils and adjoining glands, are now considerable, often occasioning occlusion of the throat, and, externally, more or less tumefaction. The swollen tonsils are covered by a thin, soft, and whitish exudation of lymph. The tongue sometimes retains its coating, but as frequently it is gradually deprived of it from the edges to the middle, and it then presents a deep red hue, and appears as smooth as if varnished: occasionally the elevation of the papillæ gives it a strawberry appearance. About the third or fourth day the eruption has reached its height. It is usually most vivid about the groins, the insides of the thighs and lower parts of the abdomen, and on the inner flexures of the joints, and it continues the longest in these situations. It is redder during any excitement, or when the child cries, and is paler in the morning, and deeper in the evening and night, when the fever is highest. The redness of the skin, at its greatest pitch, has been likened by P. FRANK and others to that of a boiled lobster, and by others to scarlet cloth. It is the most continuous, general, and deep in the most severe cases, and when the febrile symptoms are the most acute. The skin is remarkably hot, varying from 104° to 108° of Fahrenheit's scale; but not so hot as reckoned by CURRIE.

7. During the eruption, the countenance expresses anxiety and suffering when the disease is thus severe. The eyes are animated and brilliant; delirium and restlessness often occur at night; and a sleeplessness, which resists the usual means of procuring rest, is caused by the heat and stinging of the surface, and the affection of the throat. This affection is sometimes so severe, the swelling of the subjacent cellular tissue, and the exudation of soft lymph from the inflamed surface of the tonsils, fauces, and pharynx so considerable, and the secretion from the salivary glands so viscid and scanty, as to materially increase the distress of the

patient. Thirst is now urgent; respiration is accelerated, somewhat difficult and laboured, and the breath is hot. The pulse is very rapid, full, broad, and compressible. In some cases slight sopor is observed; in others a sense of sinking is felt. The bowels are generally constive; but a slight diarrhœa occasionally supervenes, with colicky pains. The urine is scanty, frequently voided, and high-coloured, sometimes albuminous. The patient exhales the peculiar odour already noticed, which is difficult to be described, although readily recognised by the experienced observer. After five, six, or eight days' duration—generally after a longer period than in measles—the efflorescence fades, at first assuming a violent tint, and afterward a pale rose or coppery hue. Generally the mucous membrane of the mouth and throat continues still red; and often it is not until now that the tongue is deprived of its coating and shows its characteristic redness and prominent papillæ. The swelling about the neck and throat now diminishes, and the next stage supervenes.

8. C. The *third stage*, or that of *desquamation*, commences at various periods in the different forms and complications of the disease; and even in the more regular type it varies remarkably as to the time of its occurrence. If the fever and eruption are slight, desquamation may follow the fourth or fifth day. If both the fever and the eruption are intense, it generally is not observed until after the seventh day, or not until the eighth or ninth. With the subsidence of the fever and of the redness of the surface, the furfuraceous desquamation commences. Occasionally this change is ushered in by a slight perturbation or exacerbation of the various febrile symptoms, followed by slight diarrhœa, or by epistaxis, or by the catamenia in adult females, or by a copious discharge of turbid urine, depositing a whitish or rose-coloured sediment, or by a free perspiration, having a strong and peculiar odour. The affection of the throat in this regular type of the malady becomes less severe, although, in some cases, it is not ameliorated until a later period; and the external swelling continues somewhat longer, the internal exudations still remaining, or proceeding for a short time. The pulse evinces less irritative excitement; is less full, less quick, but still accelerated, and soft or weak. The tongue is clean, but red and flabby; and it does not regain its natural hue until after the guttural affection is removed. As desquamation proceeds, the surface becomes paler; the epidermis exfoliating in small furfuraceous whitish scales on the trunk of the body, and in large scales or lamellæ where the epidermis is thicker, as in the extremities, and in the hands and feet. With the desquamation the function of cutaneous transpiration is gradually restored, and convalescence commences. But the pulse often continues accelerated or weak, or very compressible; the urine sometimes albuminous, or the bowels disordered; and convalescence becomes interrupted, delayed, or entirely arrested by some serious consecutive affection hereafter to be mentioned, and which should be anticipated and guarded against. In some instances the desquamation does not occur for several days after the redness of the skin has disappeared, or not until a fortnight or three

weeks have elapsed; but it usually follows the same order as that observed by the progress of the eruption.

9. II. OF THE TYPES AND IRREGULAR FORMS AND COMPLICATIONS OF SCARLET FEVER.—The *types, forms, or varieties of scarlatina* vary remarkably, not only in individual sporadic cases, but even in different persons of the same family in the same epidemic. The forms are remarkably modified as respects, 1st. The characters and duration of the eruption; 2d. The type or character of the constitutional affection—the nature of the fever; 3d. The seat and nature of the complication; and, 4th. The nature and prevalence of the sequelæ, reliquæ, or consecutive diseases. The irregularities, or anomalous forms (as they have been usually termed) of this malady require a much more serious attention than the more regular states; for these latter are not more frequently met with than the former, and are seldom attended with danger, unless they are neglected or mismanaged; while the former are for many years the most prevalent forms of the disease, and are much more frequently attended by danger—sometimes the most imminent danger—as regards either their invasion and progress, or their sequelæ. Like measles, but still more remarkably than that malady, scarlet fever presents the utmost diversity of form, severity, and complication—a diversity depending upon epidemic constitution, upon local or endemic causes, upon the accumulation of morbid exhalations, and upon undue crowding and the absence of sufficient ventilation.

10. Of these several circumstances tending to modify the nature and form, or to extend or limit the prevalence, or to complicate the character of scarlet fever, there is none more influential than the prevailing *epidemic constitution*—the "*Constitutio morborum stationaria*," first insisted upon by SYDENHAM, and recently by AVTENREITH, and by one of our best and most practical writers, Dr. GRAVES. There is no kind of fever which displays a greater diversity in its nature and complications, according to the prevailing epidemic constitution, than scarlet fever, or which manifests the character of such constitution more remarkably than it. Upon whatever cause this stationary epidemic constitution may depend—whether or not it may be connected with the long prevalence of dry, or of wet, or of cold, or of hot seasons, either of which has been observed to occur for several years in succession, giving rise, accordingly, to either inflammatory, or adynamic, or gastric, or other forms of the malady; or whether or not it may be aided by prevailing states of the electricities influenced by these conditions of the seasons—there can be no doubt of its influence: an influence which has been duly recognised by those whose experience has been of sufficient duration to have observed the changes of those epidemic constitutions, or whose learning has made them acquainted with the experience of other observers. The *forms and complications* of the disease, therefore, which will require an especial notice at this place, are, 1st. Those which respect more particularly the appearances of the eruption; 2d. Those which consist chiefly of the state of vascular action and vital power; and, 3d. Those predominant affections which arise either in the course of

the disease, or as a consequence or consequence of it.

11. i. THE APPEARANCES OF THE ERUPTION OF efflorescence are always deserving of attention, for the purpose not only of diagnosis, but also of furnishing indication of the state of vital power.—A. The eruption may be *partial*; in this case it is observed chiefly in the neck or chest, or on the trunk, or on the flexures of the joints, or on other parts, in the form of red patches, of variable extension. Sometimes the redness is excessive, deep, and extensive, or general; at other times it is slight or pale. Frequently redness is uniform throughout. Occasionally a number of small violet-coloured points are dispersed through the reddened ground; these points differing, however, from the punctuated form of eruption. In some cases a miliary eruption, or miliary vesicles—the *scarlatina miliiformis* of P. FRANK—more or less abundant, appear at the commencement, more frequently than at the decline of the efflorescence, and are found most frequently on the neck and chest, and on the insides of the thighs and arms. These vesicles are sometimes interspersed with sudamina, or with papulæ, but very rarely with true pustules. Owing to the existence of these secondary or intercurrent eruptions, scarlatina has been termed *miliiformis*, or *papulosa*, or *phlyctenosa*. These irregularities are not indications of any departure from the usual course of the disease, nor of an unfavourable result.

12. REUSS, RAIMANN, and HILDENBRAND have observed, in rare instances, the eruption on the second day of the efflorescence, of *bullæ* of a dark red colour, above the size of a nut, containing a yellowish serum, and resembling that produced by a blistering plaster. The cuticle breaks, and, the fluid being discharged, a sore remains, which follows the course of the constitutional malady—*scarlatina pemphigodes*, HILDENBRAND. The few cases in which this state of eruption has been observed have been characterized by a remarkable degree of heat of skin, with a disposition to a septic or putrid condition. The only instance in which I observed this appearance of the eruption was that of a man of middle age, referred to hereafter, who accidentally allowed the discharge from the throat of his child shortly before death from malignant scarlatina, to remain on parts with which it had come in contact for some time. In the more malignant or dangerous states of this fever, the eruption assumes a deep, or dark, or livid appearance, or an almost violet tint, the darkness of the hue being great generally in proportion to the malignancy or putro-adenia characterizing the malady, to the depression of vital power, and to the change in the blood. In some of these cases, petechiæ or ecchymoses are found more or less abundantly interspersed in the deep red or livid surface. In rarer instances the skin exhibits, in patches, altered dark blood effused between its layers—*Scarlatinal purpura*. This hæmorrhagic tendency, arising from extreme deficiency of vital power in connexion with a poisoned or altered state of the blood, in which the fibrine has lost its power of vital cohesion, is remarkable in some epidemics, especially in those of a malignant or putro-adenic character.

13. B. Besides irregularities in the form and

appearances, the eruption may be abnormal in its *course* and *duration*. It may be long in appearing, the fever continuing three, four, or five days before any eruption breaks out. This not infrequently occurs in the more dangerous and complicated cases. On other occasions the eruption is remarkably early, especially in very favourable cases, when it sometimes almost immediately follows the fever, the symptoms of which may be so slight as to escape detection, or may be masked by some antecedent or existing affection. The efflorescence having made its distinct or early appearance, may either disappear prematurely or suddenly, or it may continue an unusually long time. The *retrocession* of the eruption may be occasioned by cold or by an internal complication, or intercurrent affection. Occasionally the eruption disappears on the first or second day, and reappears again after two, three, or more days. In rare cases I have observed it continue nearly its usual time, and reappear after seven or eight days, and then proceed the usual course. In other cases the efflorescence comes out freely, then fades, and soon afterward is again abundant, thus assuming a remittent form, the remissions appearing chiefly on alternate days, the eruption being most abundant when the febrile action is highest. The eruption may, moreover, be of unusually long duration—may be prolonged to the ninth or tenth day. This is most apt to occur when it is general and intense, the persistence being longest in the extremities.

14. C. The *absence of eruption* in true scarlet fever has been doubted, but has been admitted by HUXHAM, FOTHERGILL, AASKOW, STOLL, BANG, RANOE, RUNSEY, DANCE, GUERSANT, TROUSSEAU, BERTON, and others. The circumstance of individuals having the constitutional affection, either with or without sore throat, during the epidemic prevalence of the disease, and the existence of it among the other members of the same family, in its more usual forms, are proofs of this affection being actually scarlet fever, although unaccompanied with eruption; and the propagation of the malady from cases of non-eruptive scarlatina farther confirms this opinion. Some epidemics are remarkable for the number of cases in which the eruption is not observed, the disease being characterized by the other usual symptoms, especially by the sore throat, by the appearances of the mouth and tongue, occasionally by the desquamation of the cuticle, especially in adults; and by consecutive dropsy, these cases communicating the eruptive disease. Sometimes, however, the eruption appears in so slight, partial, or evanescent a form as to escape observation. In these cases, the state of the mouth, fauces, and throat, and the constitutional affection, are the chief proofs of the presence of this malady, especially when viewed in connexion with the prevalence of it in the vicinity, or in the same house or family. It should not, however, be overlooked that sore throat with fever, both the local and constitutional affections being characterized by remarkable asthenia, amounting even to putro-adenia, may occur sporadically or endemically, or even epidemically, independently of any connexion with scarlatina, and among persons and families who have already been the subjects of scarlatina. Of these

occurrences I have met with several instances, the greater part of a family, all of which had previously had scarlet fever, having been thus attacked. (See *art.* THROAT.)

15. But a child in the same house or family in which scarlet fever is unequivocally present, may have the constitutional affection not only without the characteristic eruption, but even without the sore throat also, both these essential features of the malady being either entirely wanting, or so slight, or so evanescent as to escape detection. Is the fever which is alone present—without the usual local affection—truly scarlet fever in these cases! and is it, admitting the affirmative, capable of propagating the true and characteristic form of that disease! That the fever—the constitutional affection—is scarlet fever, notwithstanding the absence of the eruption and of the sore throat, I believe for the following reasons, namely: 1st. Its occurrence in individual members of a family, the rest of which are about or near the same time the subjects of scarlatina; 2d. Its occasional complication with the internal affections, sometimes complicating scarlatina; and, 3d. The very frequent appearance, in these cases, of renal affection, of albuminous urine and consecutive dropsy or inflammation. This form of the disease may be justly called *latent scarlet fever*.

16. ii. THE FORMS OF SCARLET FEVER DEPEND-
ING UPON THE STATES OF VITAL POWER AND
VASCULAR ACTION.—*Upon the Type or Character
of the Constitutional Affection.*—It is of the ut-
most importance to estimate with tolerable ac-
curacy the states of constitutional disturbance
existing in individual cases, and constituting in
the aggregate of cases the prevailing epidemic
character. In no disease is more discrimina-
tion requisite than in this, in determining both
its type or diathesis, and the nature of its ex-
isting complications; and as to none besides
has more misconception existed, or has more
false and mischievous doctrines been promul-
gated. “The blind have too often attempted
to lead the blind;” and the credulous and do-
cile many have submitted to the guidance of
those who formed and promulgated their opin-
ions from insufficient experience, or from an
acquaintance with a single epidemic only, and
who, estimating with as little modesty as ac-
curacy their own opinions, denounced or ridi-
culed the greater experience and the juster
views of their enlightened predecessors and con-
temporaries.

17. The constitutional character of scarlet fe-
ver is dependent upon several circumstances
which are fully stated hereafter, and which
combine to produce the pathological condition
observed even in sporadic and mild, although
most remarkably in extensive and fatal preva-
lences of the malady. The states of season,
weather, and stationary and prevailing epidem-
ic constitutions; animal exhalations, putrid ef-
fluvia, and every form of malaria, especially
when aided by warmth, humidity, and imper-
fect ventilation; and crowded, low, or close
habitations are the chief causes of the several
dangerous constitutional forms and complica-
tions which the disease assumes—causes, how-
ever, existing in intimate connexion with the
concentration or dose of the poisonous emana-
tion—of the specific animal poison, and with

the states of vital power or resistance of the
infected. The combinations, conditions, and
operations of these causes are especially con-
cerned in the epidemic occurrences of the more
malignant types or states of the disease which
are to be particularized in the sequel.

18. A. SCARLATINA MITIS.—*S. simplex.*—*Mild
or simple scarlet fever* may prevail either in a
particular district or season, or still more ex-
tensively, and for several seasons. It may
even be the most general form of an epidemic
during successive seasons. It is met with in
all circumstances and seasons, and even in
some of the members of the same family, in
which malignant and complicated cases exist,
and in the regular form above described; the
disease being characterized chiefly by the mild
or moderate degree of fever; by the efflores-
cence, which generally appears early, or on the
second and third day, and disappears with des-
quamation of the cuticle, from the fifth to the
seventh; and by the slight affection of the
mouth and throat, which, in many cases, is but
little complained of, although, on inspection,
the edges of the tongue, the fauces, pharynx,
and Schneiderian membrane and internal sur-
face of the eyelids present more or less red-
ness. However mild the constitutional affec-
tion or slight the affection of the throat, and
however free from internal complication the
complaint may be during its course, neverthe-
less the sequela may be serious, but chiefly as
respects the disorder of the kidneys and the
consecutive dropsy. Indeed, when very slight
or mild attacks occur during the more severe
or malignant prevalences of the malady, then
these mild cases are the most apt to be follow-
ed by dropsy, unless the treatment during con-
valescence be most judicious, and even although
the requisite care be taken.

19. B. SCARLATINA ANGINOSA.—*S. inflamma-
toria.* HILDENBRAND and NAUMANN.—This varie-
ty presents every phase from the mild to the
malignant, and the most varied and serious
complications. In this the fever is generally
severe or intense, even before the eruption ap-
pears, and is ushered in by rigours, stiffness, and
soreness of the throat, by intense redness of
the fauces and pharynx, and painful deglutition.
The tonsils are swollen, and a viscid secretion
from the salivary glands and mucous follicles
adhere to the inflamed surface, with patches
of lymph of a grayish or whitish-gray hue,
which covers the tonsils and pharynx, and of-
ten also the fauces, but very rarely the larynx.
The papillæ of the tongue are enlarged, and
rise through the whitish or yellowish-white fur
or mucus. The eruption is generally delayed
to the third or fourth day; but it occasionally
appears earlier, or even as early as the first
day; then subsides prematurely, and does not
return; or it reappears in various grades; or
continues with great and general intensity even
beyond the usual period. These irregularities
of the eruption depend much upon the nature
and severity of the internal complication when
this exists, and upon the violence of the fever,
which is often greatest on the second or third
day. The heat of the skin is then very remark-
able, varying generally from 104 to 108. Thirst
is urgent; the pulse is very much accelerated,
full, and strong, but not hard or constricted.
The affection of the throat is now severe, and

the swelling so great as to impede or even prevent deglutition. The inflammation frequently extends along the Eustachian tube to the ears. The fever is aggravated towards evening and night, and delirium then supervenes. During the third or fourth day, especially if the eruption fades or suddenly disappears, some internal complication of an inflammatory nature frequently occurs; or an internal affection of an inflammatory or actively congestive kind may have commenced with the appearance of the sore throat, or with the febrile action, and have entirely prevented, or delayed, or rendered irregular, the eruption. In some of these a dark efflorescence continues for three or four days, or even longer, on the backs of the hands, and on the legs and feet. In this state of the disease internal complications are frequent; the gastro-enteric mucous surface, or the membranes of the brain, or the lungs, or pleura, or even the pericardium, or the peritoneum, evincing a predominance of morbid action; the kidneys being also more or less implicated, although not so manifestly as during convalescence. The patient has complained of, and still experiences pain or aching of the loins and limbs; and the urine is very high coloured, turbid, or even bloody in some cases, and generally scanty, and voided frequently. The inflammatory action in all these complications is modified more or less from the sthenic condition characterizing the primary inflammations occurring in persons whose vital influence and circulating fluids are not contaminated by an animal poison or infectious agent. The poisonous emanation which has infected the frame, and is multiplying itself to an indefinite extent, so as to propagate the malady to all who are predisposed to it, re-enforced by obstruction of the several emunctories, so changes the states of vital power, of vascular action, and of the circulating fluids, from the healthy sthenic conditions, as very materially to modify the local complications, as respects both the state of vascular action and the morbid products or consequences of that action; so that these complications, although inflammatory in their nature, or as regards the disordered vascular action of the part affected, are imbued by a certain vice or diathesis appertaining to, and imparted by, the specific poison contaminating the frame, and are farther affected by the interrupted functions of the kidneys and skin, so as to modify them remarkably from primary, sthenic, or pure inflammations; and the modification is great in proportion to the depressing and contaminating action of the poison, and to the accumulation of excrementitious matters in the blood—to the adynamic, putro-adynamic, or septic character of the fever—the same relations subsisting between the constitutional and local morbid conditions in this disease as were shown to subsist in other fevers. (See art. FEVER, § 109, 110.) Although this type or form of the disease is often complicated, and irregular as respects the eruption, yet it frequently assumes the regular form described above (§ 4), the febrile action being generally more intense.

20. *C. SCARLATINA MALIGNA*; *Pestilens fau-cium affectus* of SGAMBATI; *Angina puerorum epidemica* of BARTHOLIN; the *Garotillo* of ZACU-TUS LUSITANUS; the *Padanchone loimodes* of

SEVERINUS; the *Angina maligna* of DE HEREDIA; the *Malignant ulcerous sore throat* of HUXHAM; the *Purpura epidemica maligna* of SCHULTZ; the *Malignant sore throat* of JOHNSTONE; the *Cynanche maligna* of CULLEN; the *Putrid sore throat* of various authors.—The type of the disease which has been last described passes into this by insensible gradations, not only as respects different cases occurring during the same season, in the same locality, but even in the same family. Sometimes even the attack may present an inflammatory character at its outset, and soon afterward assume an adynamic, typhoid, or malignant form. But it usually commences in an adynamic or asthenic form, especially in autumn and winter, and in delicate, relaxed, or exhausted subjects, in those debilitated by other diseases, and in weak female children, or those living in low, damp, and close situations. The patient is first affected with languor, lassitude, weakness, and vague pains through the body. These are succeeded by giddiness, chilliness, or shivering, followed by great heat. These latter alternate for several hours, until at last the heat becomes more constant and intense. The patient then complains of faintness, great pain in the head, and of violent sickness with vomiting, or purging, or both, especially in children, more rarely in adults. Heat and soreness are felt in the throat, and stiffness and tenderness in the neck. The face soon appears red or flushed, swollen or bloated, occasionally pale and sunk; the eyes are red, watery, heavy, or suffused. There are great fretfulness, restlessness, anxiety, leipthymia or faintness, and remarkable dejection of spirits.

21. The pulse from the first is quick, small, and fluttering; in some soft and full, but weak and irregular, but always without that firmness and strength observed in inflammatory diseases. Dr. JOHNSTONE remarks, that if blood be taken from a vein soon after the attack, instead of forming a firm crassamentum, "it continues in the state of a gelatinous texture." The urine at first appears crude like whey; as the disease advances it becomes yellowish, as if bile were diluted with it; or turbid, scanty, high-coloured, and sometimes it contains dissolved or decomposed blood-globules. At the same time as, or soon after the attack, the fauces, uvula, tonsils, and pharynx become red and swollen; and soon afterward covered in parts by ash-coloured or dark exudations, which appear as sloughs. The tongue is now deep red or brown, dry and glazed, and sometimes so tender and chapped as to readily bleed. The throat soon acquires a dusky-red, brown, or livid hue, and the exudations on the fauces and tonsils are darker, and often cover gangrenous ulcers. The febrile or constitutional disturbance presents an extremely typhoid or asthenic character, or putro-adynamia. The skin is hot; but there is little thirst, although the mouth is dry; and the teeth and lips are covered by sordes, or by an acrid fluid from the excoriated or ulcerated throat. The breath is remarkably fetid and contaminating.

22. The efflorescence often appears on the second or third day of the disease, and the hands seem as if they were stained by the juice of raspberries. It frequently soon recedes and recurs, and is generally irregular. When it is

abundant, it is often dark, dusky, or even livid; and it is often accompanied with petechiæ, more rarely with œdema. The breaking out of the eruption sometimes relieves the vomiting and purging often ushering in the disease. The parotid and sub-maxillary glands swell and become painful. The neck and throat are œdematous, the swelling sometimes extending to the breast. In this case suffocation is threatened, the breathing being rattling, as if the patient were being strangled. A viscid secretion, scanty and adhesive, is produced by the salivary glands; and an acrid, thin discharge exudes from the nostrils and from the angles of the mouth, the lips and cheeks exhibiting an aphthous appearance. The affection of the throat often extends along the tubes to the ear; and not only does gangrenous ulceration affect portions of the velum or fauces, but the tympanum and bones of the ears are destroyed, and an offensive acrid discharge flows from these parts. When the patient swallows the excoriating fluid exuded by the affected throat, diarrhœa, with excoriations of and about the anus, is of frequent occurrence. In these cases the pharynx occasionally is remarkably affected, and is covered by deep sloughing ulcers, extending in some instances to the cellular, muscular, and ligamentous structures anterior to the cervical vertebrae and intervertebral substance. The larynx and trachea, the former especially, are not infrequently implicated, occasioning sudden suffocation and death. The lesion of the throat often extends farther than the pharynx, and even implicates the upper part of the œsophagus, deglutition being difficult or painful, or the fluids being rejected forcibly through the nostrils.

23. The febrile action is often in young children attended by coma, and generally in older subjects by delirium, which often lapses into coma. The delirium is commonly low or muttering, but it is sometimes violent or phrenesied. If it ceases in the morning, it generally recurs in the evening, or is even constant. In the more violent cases, the efflorescence either suddenly disappears or becomes livid; the fauces are black, and the breath most offensive; the eyes lose their lustre, and the swelling of the neck increases. The stools and urine are evacuated involuntarily, the former being frequent, watery, and most offensive, sometimes bloody; the latter turbid, brownish, or suppressed. The surface becomes cool; the countenance bloated, cadaverous, or œdematous; the parts pressed upon excoriated or sphacelated; the tongue brown, hard, or dry; the breathing laboured or interrupted by singultus; and death follows, with insensibility, congestion of the lungs, and great alteration of the state of the blood, and of all the circulating and secreted fluids. This result may appear very early—on the second, third, or fourth day. I have seen it occur on the second day, owing, in some instances, to the extension of the affection of the throat to the larynx, the patient dying asphyxied; in others, to a sudden coma, caused, probably, by serous effusion and alteration of the blood, and, in some, to congestion of the lungs, the depression of organic nervous influence produced by the poison, and the morbid state of the blood, occasioning or increasing these local changes, and consecutively abolish-

ing the vital functions, especially those of the brain, lungs, and heart.

24. *D. SCARLATINA SINE EXANTHEMATE.*—*S. eruption, R. WILLIAMS.*—Scarlet fever may occur without any eruption, cases of this kind appearing chiefly during severe or fatal prevalences of the malady, and often in the same family in which it pursues a regular course. In this variety the nature of the disease is indicated by the morbid affection of the mouth, fauces, and throat, and by the febrile action, which is generally of an asthenic or low character. Dr. JOHNSTONE remarks respecting the malignant angina, prevalent shortly before the time at which he wrote, that "in some cases people have been seized with a severe angina of this kind without any eruption at all; yet even in these cases a great itching and desquamation of the skin have come on. This, however, has always happened among adults, not at all in children." (P. 33.)—This variety is not always so limited, for I have observed it on several occasions in children, but in them the absence of the eruption appeared to be owing to the internal complication so frequently attending it in them. Dr. WILLAN observes, that "it is evidently a species of scarlatina, because it affects some individuals of large families, while the rest are labouring under some form of scarlatina, and because it is capable of communicating by infection all the varieties of that disease." Dr. SIMS, RANOE, EICHEL, HAGSTROEM, and STRUVE, on the Continent, noticed this variety; and FILTER, SPEUN, and others remarked that desquamation of the cuticle frequently occurred during convalescence nevertheless. Dr. HEBERDEN says that he has seen the eruption so partial as to be limited to the back of the left wrist. J. FRANK, that both he and others have seen many cases of scarlatina without any eruption at all. Mr. MURRAY mentions the occurrence of twenty cases without any eruption, when the disease prevailed at Aford, in Aberdeenshire. Mr. WOOD adduces sixteen cases which he observed during the occurrence of the disease in 1832 and 1833 at Edinburgh, in which no eruption was observed, and he considers these cases to have been those of scarlet fever, because none of these patients became afterward affected with the fever and eruption, though very freely exposed to contagion in the sick-rooms and convalescent wards. Dr. R. WILLIAMS remarks, that "there is seldom a year in which scarlatina has been in any degree epidemic; that cases have not occurred in which patients, not having previously had the scarlet fever, are seized with severe fever and sore throat, unaccompanied by any eruption; and on subsequent exposure to the contagion of scarlatina, they have been found insusceptible of the action of that poison; and hence it is fairly inferred that the disease they have passed through must have been a variety of scarlet fever." During the many opportunities I have had of observing scarlatina, cases of this variety have come before me, but on no occasion have they been so numerous as in 1848. But it should not be overlooked that cases of most severe fever and sore throat, with all the indications of malignity, or putridædynamia, may occur, as I have observed in several cases, in persons who have already had scarlet fever; and they may thus appear in sev-

eral members of the same family, probably owing to the existence of endemic contaminating causes, to which I have had occasion to impute them. It may appear singular, as, indeed, Dr. WILLAN has observed, that the slightest and the most violent cases of eruptive fevers—cases which vary as much in fatality as a flea-bite and the plague—should be associated together and spring from the same origin. Experience has, however, proved that scarlatina simplex, the anginosa, the maligna, and the scarlet sore throat, without the efflorescence on the skin, are merely varieties of the same disease, and that all of them proceed from, and communicate the same infection.

25. There are certain points respecting this variety of the disease which have not been sufficiently investigated, namely, 1st. Is the non-appearance of the eruption owing to the idiosyncrasy? 2d. Is this occurrence owing to the existence or severity of some internal complication? 3d. Is it more frequently followed by affections of the kidneys or other sequelæ than the forms of scarlatina already considered?—(a) It is difficult to determine the degree of influence exerted by *idiosyncrasy* in this or in other maladies, as the reference of an anomaly to this cause is merely an attempt to escape from a difficulty, and even when the most confidently asserted it is often no more than an unsubstantiated opinion.—(b) As to the *second* point, my experience induces me to conclude that this variety of the disease is frequently complicated, or followed by dangerous sequelæ; but I am unable to state the exact frequency or the numerical amount of these morbid associations, more particularly in comparison with the other varieties of the malady. I may add, that the fever characterizing this variety is most frequently of an asthenic or adynamic kind, even although the affection of the throat may not be very severe or malignant, which, however, it often is, especially in some epidemics; and that complications are frequently found at an early period, upon close examination, but that they are often more or less latent, or masked, until they have reached a formidable height, or they often escape observation until they are seriously advanced, or are displayed by a *post-mortem* inspection.—(c) As to the *third* question, I believe that affections of the kidneys are not merely occasional sequelæ, but are either concomitants or early complications of some cases of this form of scarlatina; for I have observed that the urine has been more or less albuminous in most cases, and even during, as well as after the disease, although dropsy has not supervened. It may be farther remarked, that obstructions of the functions of the kidneys in the course of the malady, and the consequent accumulation of morbid matters in the blood—the deficient depuration of the blood—are the causes not only of the consecutive dropsy, but also of the more immediate complications, or inflammatory congestions and sequelæ observed in the course of this and other forms of scarlet fever.

26. *E. SCARLATINA LATENS.—Latent Scarlatina.—Suppressed Scarlatina.—Masked Scarlet Fever.—Scarlatina without Eruption and without Sore Throat.*—Both in public and private practice, chiefly the former, rare instances of dropsy, especially anasarca, have for many years

back come before me, commonly in children, and in families or localities where scarlatina prevailed; and I have been told by the parents that neither eruption nor sore throat had been complained of previously to the appearance of the dropsy. I generally disbelieved the report, knowing that the mildest forms of scarlatina are most frequently followed by anasarca; and inferred that either sore throat or efflorescence had existed, but in so slight and evanescent a form as to escape detection. It was not until early in this year (1848) that I became fully convinced of the actual existence of this variety—of a latent scarlatina, and that the constitutional affection may be produced by this specific poison without developing its two principal or characteristic features—the eruption and the sore throat; the infection causing, nevertheless, lesion of the kidneys, with other concomitant sequelæ of a most dangerous kind. To one of these very serious and complicated cases of scarlatina I was called in this year by my friend, Mr. JOSEPH HOULTON, who had also recognised the scarlatinous nature of the disease, the case having occurred in a house where this malady existed. During 1848, other cases of the same kind came under my notice, all of those which I then saw having been of a complicated nature, and I have heard of several similar instances from other practitioners. Judging from the cases which I have seen, the dropsy consequent upon this latent form of scarlatina is more severe, complicated, and fatal than when it follows the more regular or usual forms of the disease. Is this owing to an early or premature affection of the kidneys resulting from the scarlatinal poison having prevented the manifestation of the disease in the skin and throat, the predominant lesions in this variety occurring in the urinary organs and serous membranes, and not in the usual situations? And is a certain amount of vascular action, with affection of either the throat or skin, or both, requisite to prevent the consecutive obstruction or lesion of the kidneys, productive not merely of dropsy, but also of other concomitant or consecutive lesions? If it be admitted that the morbid effects of the scarlatinal infection or poison are exerted primarily and chiefly on the kidneys and serous membranes or other internal parts in these cases, it may be reasonably inferred that the usual manifestation of the infection on the skin and throat will be thereby prevented and suppressed, and that the danger of the disease will be greater when these important organs and parts are attacked than when the skin and throat are moderately and not malignantly affected. Upon referring to authors respecting this variety of the disease, I can find no notice of it excepting in the clinical lectures of Dr. GRAVES, where he states that some years ago scarlatina attacked all the children in the family of a medical practitioner, with the exception of one young lady, who, when the children were convalescent, was attacked by anasarca. Her father was much struck with the occurrence, and felt convinced that it was the result of latent scarlatina. One topic as to this variety is worth consideration, viz., the relation subsisting between the infection, the fever caused by it, and the renal and other consecutive affections, as to whether the disease of the kidneys and the often associated

affections of serous surfaces, and of other parts, are the immediate effects of the poison in these cases, no eruptive fever, either with or without its usual concomitants of sore throat and efflorescence, having existed; or whether this fever and these concomitants actually preceded the renal and other affections, but in such a slight and evanescent manner as entirely to have escaped observation. From what I have myself observed, especially during 1848, I conclude that scarlatina may be prevented from being developed on external parts, owing either to the state of the constitution of the person affected, or to the primary operation of the scarlatinal poison on the urinary organs and serous or other structures. That the state of the recipient has something to do with this irregularity, or latent form of the disease, is indicated by the circumstance that most of the patients in whom I have seen it were cachectic or anæmied, their vital energies appearing insufficient for the development of the characteristic local and external manifestations of this malady. It is not unlikely, however, that the primary fever, consequent upon the infection, may have been so slight in all its phenomena as to have escaped detection; and yet, as in the slight but more obvious cases of eruption, to be followed by severe consecutive disease, these latter cases being admitted to be the most liable to such consequences.

27. *iii. COMPLICATIONS OF SCARLATINA.*—The complications, or predominant affections of vital organs or parts, constitute the most important topics in the history and pathology of scarlet fever. It may be remarked generally, as regards them, that their nature and tendency depend chiefly on the character of the constitutional disturbance; on the states of vital or nervous power, and of vascular action, in connexion with the condition of the blood; and that they may be inflammatory, or actively or passively congestive, or either of these associated, with so remarkable a loss of vital power and cohesion as to be rapidly followed by disorganization. In all complications occurring in the course of scarlatina, or of other specific infectious maladies, the local affections should be viewed as prominent lesions only, the whole frame being more or less infected or poisoned by the animal miasm, rather than as independent morbid conditions requiring a special treatment. However inflammatory, or however congestive the complication or prominent disorder may seem in these maladies, it should never be viewed, either pathologically or therapeutically, in the same light as inflammation or congestion occurring primarily or independently of a specific infection. The former has a peculiar character imparted to it by the specific poison, lowering and modifying organic nervous power and contaminating the fluids, while the latter is devoid of these poisonous influences and changes, and of their progressive consequences. Accordingly, we find that the same means as are successfully employed to remove inflammation, or congestion or effusion taking place primarily or independently of a specific infection, would be either quite inefficient or even injurious, if employed against these, when supervening as complications or prominent disorders in the course of scarlet fever or other infectious maladies. These latter are imbued with the con-

stitutional characters of these diseases, and partake of the type and diathesis which they manifest. The most important of the *complications* or *prominent affections* observed in the course of this malady are, 1st. Congestion or other lesions of the urinary organs. 2d. Diffusive or asthenic inflammation, extending from the throat to parts in the more immediate vicinity. 3d. Diffusive or asthenic inflammation of the gastro-intestinal villous surface. 4th. Affection of the membranes or substance of the brain. 5th. Asthenic pleuritis or pericarditis, or both. 6th. Asthenic pneumonia, or congestions of the lungs. 7th. Affection of the synovial membranes with effusion into the joints. Other organs or parts may be seriously affected, or even disorganized in the course of, or during convalescence from, scarlatina; but certain of these will be comprised under the head of sequelæ; and two or more of the affections now enumerated may even exist in the same case, either coetaneously or in rapid succession.

28. *A. The kidneys* may become affected in a very prominent manner early in the course of the disease; indeed, I believe them to be always more or less affected at an early period, although this affection has been overlooked at this period, and recognised only during the processes of desquamation and recovery. It is chiefly at certain seasons and during certain prevalences of the distemper that this early obstruction of these organs is most remarkable. I have met with it on many occasions; very few authors have mentioned the occurrence even of its usual consequences at this period. JOHNSTONE, however, observes, that "in some the face is much bloated and very sallow, the whole neck much swelled, and has a cadaverous look, and the whole body oedematous to such a degree that an impression made with the finger will remain fixed. The breath, towards the fourth or fifth day, becomes more and more fetid, and the patient spits up a large quantity of stinking purulent mucus, sometimes tinged with blood and of a livid colour." (P. 38.) In the cases attended by more or less œdema, or anasarca, during the period of the eruption, or associated with a deep or dark-coloured eruption, the patient, if not delirious or comatose, generally complains of much aching in the loins and pains in the limbs; and the urine either is very scanty, very high coloured, of a muddy brown, or dark-red colour from the mixture of blood globules, sometimes albuminous; or it is more or less or altogether suppressed. The importance of ascertaining the existence of this complication during the early stages of the disease is extremely great, inasmuch as the issue will depend much upon the treatment adopted for it. I cannot hesitate to state my conviction that, in many cases which terminate fatally at an early period of the disease, whether the eruption be abundant or scanty, or altogether suppressed, this issue is in great measure owing to the early implication of the kidneys having been overlooked; for I have remarked, in many instances, as respects both the symptoms during life, and the appearances of the kidneys after death, sufficient evidence to convince me that *these organs are remarkably congested, and their secreting and tubular surfaces are the seats of a similar vascular injection or efflorescence to that existing in the*

vascular rete of the skin; and that this efflorescence on the surfaces of the uriniferous tubes, &c., and the associated swelling and congestion of these organs during the early stages of the malady, either impede, or interrupt, or altogether suppress the function of urinary excretion, and thereby occasion an accumulation of excrementitious and contaminating materials in the blood, and consecutively an increase of the poisonous action of the infected blood upon the nervous system and on vital organs and parts, thereby producing farther complications, more especially those about to be described.

29. In this early period of the disease, the interrupted functions of the kidneys, produced in the manner now stated, has the effect not merely of preventing the discharge by these emunctories of the usual excremental matters in the blood, but also of arresting the evacuation of those morbid materials evolved in the blood from the action of the infectious miasm upon the nervous and vascular systems. The obstruction of the kidneys, arising, as just explained, during the early stage of the disease, produces a more immediate and a more intense or acute effect, than the obstruction so frequently caused subsequently, and during or after the process of desquamation, by the accumulation and infarction of the epithelium scales thrown off from the uriniferous tubes. The obstruction in the uriniferous tubes, caused by the accumulation of epithelium scales in them during this latter period, is entirely the result of a species of desquamation, as respects these tubes, consequent upon the vascular action, congestion, and tumefaction of which they, with other parts of the kidneys, are the seat in the eruptive or early stage, and which in this stage frequently becomes, as just stated, the source of the most acute and fatal complications. The obstruction of the kidneys in the early stage, arising, as now shown, is often more complete and rapid in its accession than that which follows in the last stage as a process of desquamation; and hence the consequences are generally not so severe nor so fatal in this last stage, especially when due precautions are used during the period of desquamation.

30. *B. Inflammation of a more or less asthenic or diffusive kind* may extend in more than one direction from the throat, especially in the more malignant states of scarlet fever; and this complication may be more frequent in certain seasons and epidemics than in others.—(a) The most dangerous and rapidly fatal of these extensions of the local affection are *laryngitis* and *tracheitis*. When the angina attending scarlatina is not of a malignant kind, and when the pulse and affection of the throat do not indicate much vital depression or malignancy, the epiglottitis and larynx very rarely betray any disorder. But in malignant cases, and in adults, especially those who have been addicted to the use of spirituous liquors, or whose constitutions are broken down, this extension of inflammation to the larynx and trachea, and consequent asphyxia, are not rare. In most of these cases the larynx is only or mainly affected; but in others, especially in children, the trachea is also implicated. In the more malignant cases, death may occur in little more than twenty-four hours from the commencement of the attack, owing to this complication. Of this I

have met with two or three instances in adults, one in a man aged between fifty and sixty. In the cases of this kind which I have had an opportunity of examining after death, there was much firm lymph exuded over the tonsils and pharynx, extending into the larynx, the tissues underneath being swollen, injected, and œdematous.

31. (b) *Pharyngitis* is generally present in a greater or less degree in most of the severe cases of the anginous form of scarlet fever, and more especially, and in a most asthenic form, in the malignant variety. In many of these, especially in certain epidemics or seasons, the morbid action extends to the posterior nares, the nostrils and fauces, on the one hand, and to the upper portion of the œsophagus on the other, and is accompanied with the exudation of grayish lymph, which coagulates on portions of the affected surface, and imparts the appearance of sloughs. In some cases, instead of this exudation, an acrid or sanious discharge of an excoriating nature is observed, with sloughing ulcers; but these latter are more frequently found in some epidemics of this malignant malady than in others. In most of these cases attempts at deglutition are either very painful and difficult, or altogether abortive, matters being thrown out through the nostrils on attempting to swallow them. Sloughing ulceration is most frequently observed in the tonsils, and is more rare in the fauces, pharynx, or its vicinity; but this and other changes in the throat vary much in different epidemics. They are observed chiefly in the most malignant cases; and even in more rare instances of this kind which recover, the morbid action has extended posteriorly to the tissues and parts between the pharynx and bodies of the cervical vertebrae, until these latter, and the intervertebral substances and ligaments, have become implicated, and dangerous, if not fatal, sequelæ have followed the pharyngeal complication. Of this I have met with several instances in the course of practice (§ 47).

32. (c) The extension of the anginous affection 'along the *Eustachian tubes* to one or both ears, is a frequent and most distressing complication of the more severe states of this fever, and is not infrequently attended by destruction of portions of the soft palate, and of the small bones and *membrana tympani* of the ears. In some instances, caries of a portion of the temporal bones, and the extension of irritation and inflammation to the membranes, and even to the substance of the brain, have followed, either immediately or remotely, upon the occurrence of an *asthenic otitis* in the course of malignant or severe scarlatina. In these cases, a discharge more or less copious, and always offensive, takes place from the ears, and in rare instances even *hæmorrhage* from the ears occurs. I have not observed any instance where the hæmorrhage from the ear has been excessive; but Dr. GRAVES has adduced a case in which it was so great as to prove fatal; and it has also been noticed by FOTHERGILL.

33. (d) *Epistaxis* may occur in the course of scarlatina from very different pathological states. It may attend, or appear early in, the stage of eruption, especially in plethoric children, in those accustomed to epistaxis, or in those of a sanguine temperament and hæmor-

rhagic diathesis. If it be moderate, or even considerable, it may alleviate the cerebral symptoms, and be even critical or beneficial. This, however, occurs chiefly in the more inflammatory states of the disease; but when it is excessive, or when it accompanies the malignant form, it may be only one of the modes in which a fatal issue takes place. Even in the more inflammatory or sthenic forms of scarlatinal angina, an intercurrent epistaxis may be so excessive as to lower the power of vital resistance, and the patient may sink either from exhaustion, and from the want of correspondence between the capacity of the vascular system and the amount of blood contained in this system; or he may suffer another complication, favoured, if not more directly caused, by the hæmorrhage, namely, the extension of inflammation, in an asthenic or diffusive form, to the cellular tissue and glands of the neck. When epistaxis occurs in the course of malignant scarlatina, and is preceded by an offensive discharge from the mouth, nostrils, or ears, it may be viewed as a consequence of gangrenous or sloughing ulceration of the fauces, pharynx, or posterior nares, and, generally, it then hastens or causes dissolution. Epistaxis and bleeding from the throat, in these circumstances, are not rare, and have been noticed as more frequent occurrences in some epidemics than in others. These complications have been mentioned by HUXHAM, FOTHERGILL, GRAVES, and others. FOTHERGILL remarks that "the sick sometimes bleed at the nose towards the commencement of the disease; and the menses very often appear in those of the female sex who are of an age to have them." (*Works*, vol. i, p. 375.) And at another place he states that "it has happened in this distemper that hæmorrhages from the nose and mouth have suddenly carried off the patient. I have heard of the like accident from bleeding at the ear. But these fatal discharges most commonly happen after the patient has been ill several days; and it seems more probable that they proceed from the separation of a slough, rather than from a fulness of the vessels, or an effort of nature to relieve herself by a salutary crisis." (P. 376.)

34. (c) *Diffusive or asthenic inflammation of the cellular tissue of the neck* is one of the most dangerous complications of scarlatina, and is apt to occur when the throat is most malignantly affected. Dr. JOHNSTONE has remarked upon the frequency of this complication in the epidemic scarlatina of 1778. "The parotids also swell," he states, "grow hard and painful to the touch, and, when the disease is violent, a large oedematous tumour surrounds the neck, extends to the breast, and greatly increases the danger. The breathing then becomes more difficult, with a kind of rattling noise as if the patient was suffocating." This extension of the disease to the glands and cellular tissue of the neck is frequent during the prevalence of malignant scarlatina. I have often observed it, and it has been duly remarked upon by Dr. KENNEDY, GRAVES, OSBREY, CHARLTON, and others. This diffusive state of inflammation may be greatest on one side, or it may surround the whole neck and throat and descend to the pectoral muscles. It may accelerate or cause death before passing into gangrene or suppuration, into either of which it may rapidly lapse;

and it may exist with the eruption or without it, or the parts affected only may present a dark or dusky erysipelatous hue. It is evidently the result of local contamination, spreading from the ulcerated and infected throat; and it may supervene either as a complication or sequela of the distemper; but, however it may appear, it requires the intentions and means of cure described in the article on diffusive inflammation of the CELLULAR TISSUE.

35. *C. Asthenic or diffusive gastro-enteric disorder* is a very frequent complication or prominent affection in the more malignant cases of this malady. It may occur either with or without vomiting, or it may only commence with this symptom; and it may be attended by an eruption of a more or less deep tint; or it may cause the sudden suppression, or the non-appearance of the eruption. It may be caused by the passage of the excreting discharge from the throat into the stomach, especially in children, who seldom spit out the discharge, the gastro-enteric surface being irritated or excoriated by this morbid matter; or it may arise primarily as a prominent phenomenon of this fever, and by its increase, or general diffusion over the digestive mucous surface, prevent the evolution of the efflorescence on the cutaneous surface. Dr. JOHNSTONE remarks, that the acrid matter passing from the throats into the stomachs of children is "one reason why they are attacked with those violent gripings, dysentery, and excoriations of the anus and buttocks which sometimes attend the distemper, and show that the sanies retains its virulence throughout the alimentary canal." (P. 39.) The same statement had, however, been made by Dr. FOTHERGILL thirty years previously, and nearly in the same words (*see his Works*, vol. i, p. 374). HUXHAM, also, remarks that a sudden stoppage of the discharge from "the mouth and nostrils actually choked several children; and some swallowed such quantities of it as occasioned excoriations of the intestines, violent gripings, dysentery, &c.—nay, even excoriations of the anus and buttocks." (*On Fevers*, p. 280.) Dr. GRAVES adduces a case in which these excoriations were observed around the anus, but in it the cutaneous eruption was intense. In most of the cases in which I have observed irritability of stomach and diarrhœa, with or without excoriations of the anus, in the course of scarlatina, the eruption was either suppressed, or partial and scanty, or prevented from appearing; the throat, however, being more or less affected. In the first two cases of this complication which came under my care, and which I attended with Dr. CLUTTERBUCK in 1821, the eruption disappeared, diarrhœa occurred, and profound coma, with unconscious evacuations, supervened and farther complicated the disease. Nevertheless, both cases recovered. When diarrhœa complicates this distemper, especially in children, coma, or convulsions, or insensibility from vital exhaustion, not infrequently supervenes. When the diarrhœa is moderate and not attended by vomiting, and when the evacuations are bilious or feculent, then it may be salutary, or at least not injurious; but when it is consequent upon severe affection of the throat, or is attended by oedematous swelling of the neck, or is severe, the stools being watery or slimy, muddy, and very

offensive, it is liable to be followed by coma or fatal exhaustion.

36. *D. Convulsions, coma, and tremours* are frequently observed in the course of the more severe cases of scarlatina, and in the more nervous form of the disease; or in children of a nervous and susceptible temperament, convulsions, delirium, coma, and tremours may occur in succession. These complications, like many others, may appear either when the eruption is very full and general, or when it suddenly or prematurely fades, or when it becomes partial or recurrent; but generally the skin continues hot and dry.—(a) In very young children, *convulsions* may take place at or during the commencement of the distemper—and in this case they generally usher in a malignant or severe attack—and they may not appear afterward; but they may occur at any period, or not until near the fatal termination of the disease. They are seldom attended by squinting, and the pupils of the eyes are rarely dilated; generally they are contracted.—(b) *Coma* may supervene very early; but in children above five or six years of age it is generally preceded by delirium, and, in children under this age especially, it is often attended by partial convulsions. When coma takes place early in the disease, it can not be imputed to serous effusion between the membranes or in the ventricles of the brain, but rather to congestion or to a loss of cerebral power; and even when it supervenes at a more advanced period, it is to be attributed rather to these states than to effusion, although vital exhaustion and the morbid state of the blood may also be concerned in causing it. In most instances, and in whatever stage of the disease in which it occurs, the pupils are generally contracted. Although a dangerous, it is not a fatal complication, for I have seen several patients recover from it.* When, however, it is attended by disappearance of the eruption, by a glassy state of the eyes, pallor and sinking of the features, tremours or startings of the tendons, and other signs of sinking of the powers of life, a fatal issue soon follows. Coma, convulsions, and other nervous symptoms, may occur also as *sequelæ* of scarlet fever, but generally in connexion with renal obstruction and anasæra (§ 41, *et seq.*).

37. *E. Congestion of the lungs, bronchitis, congestion, or asthenic pneumonia, and even combinations of these, with or without pleuritis*, are frequently prominent affections in the course of the more severe forms of scarlet fever. In most instances both lungs are affected, and bronchitis and lobular pneumonia are not infrequently associated, or are rapidly consecutive of each other. In the most severe cases, the general diffusion of disease through both lungs, added to other existing morbid conditions, has terminated life in from thirty to forty hours, or even in a shorter time, after the first appearance of the pulmonary complication. In

these cases the substance of the lungs soon becomes solidified, especially in parts, and infiltrated with a bloody serum; the state of congestion insensibly passing into asthenic solidification or splenization, especially in the posterior or depending parts. The complications now mentioned may also occur in the milder or less malignant states of the disease, but generally either in an advanced stage or as sequelæ; and in these circumstances they approach nearer to the usual character which these affections present, although more or less modified, and requiring, owing to the state and nature of the constitutional disturbance and contamination, a peculiar mode of treatment.

38. *F. Pleuritis and pericarditis* may take place either separately or in combination, or in connexion also with affection of the lungs. The occurrence or association of these varies much in different epidemics and seasons, whether appearing as complications or as sequelæ of scarlatina. As *complications*, they are met with chiefly in severe or irregular cases, in which the eruption either is suppressed or does not appear; and, as *sequelæ*, they most frequently follow mild cases, and in connexion with anasæra and disorder of the urinary excretion; and, in these circumstances, they are soon followed by effusion, especially into the pleural cavities. These prominent lesions may exist and escape detection, either until they are far advanced, or until disclosed by a post mortem examination. This is particularly the case with respect to pericarditis, and even as regards pleuritis. A very careful and frequent examination is required to determine its presence in young children during the severer states of the malady.

39. *G. Peritonitis* may appear as a complication of scarlatina, either consecutively of diarrhœa and vomiting, or independently of these. I have, however, rarely met with it during the stages of the eruption; but more frequently as a sequelæ of the malady, and in connexion with obstruction of the kidneys and anasæra. It may generally be recognised, at whatever period it occurs, by the tenderness, fulness, and tension of the abdomen; by vomiting, and the heat and dryness of the surface of the trunk; and most frequently by the disappearance of the eruption. It usually soon terminates in effusion and in death, if not early detected and treated by means which will arrest the morbid action without depressing the vital energies, an intention which on a few occasions may be accomplished.

40. *H. Affections of the joints, erysipelas, gangrene, &c.*, may occur during an advanced stage of the more malignant states of the distemper, or even as sequelæ, during the period of desquamation, and, with the rest of the complications already noticed, are to be attributed chiefly to the following pre-existing changes: 1st. To the change produced by the infectious miasm upon the organic nervous influence and vascular system. 2d. To the alteration of the blood arising from this primary change, and from the action of the miasm on the constitution of the blood itself. 3d. To the active congestion, obstruction, and consecutive changes taking place in the kidneys at an early stage, as well as during the periods of desquamation and convalescence, whereby the blood is farther

* HILDENBRAND observes: "Insignem vero, et quasi innatam, febris scarlatinae miasma ad membranas serosas, et in primis ad membranam arachnoideam encephali habet proclivitatem, ita quidem, ut non solum exanthemate derепente represso vicarius in cerebro libentissime subnascentur reactiones, verum etiam letissimæ florente manifesta evolvantur congestiones cephalicæ, aut veræ encephalitis, indicia. Quod autem arachnoidea, et non alia patitur meningis, effusiones serosæ in preceptorum cadaveribus conspicuæ evincunt."—(*Institut. Pract. Med.*, t. iv., p. 383.)

changed by the accumulation of excrementitious elements or materials in it, owing not only to the obstruction of the kidneys, but also to suppression of the functions of the skin—two of the chief excretories, by means of which effete and hurtful materials are carried out of the circulation—these two chief organs of depuration being more or less obstructed or interrupted in their functions during this disease. Owing to these consecutive series of changes, serous effusions take place not only in the larger shut cavities, with more or less irritation or asthenic inflammation of serous membranes, but also into the cavities of the joints, irritating the synovial membranes and eroding the cartilages. Owing to these changes, also, the internal surface of the blood-vessels, in predisposed parts, become inflamed or obstructed, and eliminating surfaces irritated or diffusively inflamed; the affected parts, owing to the depressed state of organic nervous power, and to the morbid condition of the blood circulating in it, soon losing their vital cohesion, and passing into splacelation—changes readily accelerated and increased by pressure and the contact of morbid secretions or excretions.

41. III. THE SEQUELÆ OF SCARLATINA.—Having given the *complications* or prominent local affections of scarlet fever that amount of consideration which their importance demands, and which has not been accorded to them by previous writers, and having pointed out the sources or causes of their origin, of their severity, and of their fatality; and having stated that an attentive examination of the early as well as of advanced phenomena of scarlatina, and the lesions observed after death, *show these sources or causes to be chiefly, or in great measure, the changes which take place in the kidneys at a much more early period of the distemper than has hitherto been believed*, I now proceed to consider the more important *sequelæ* of the malady, and with due reference to their sources. If the inferences at which I have arrived from an attentive observation of the phenomena of scarlet fever be received, the *sequelæ* as well as the complications of the disease may be assigned to nearly the same sources. The *primary* obstruction of the kidneys is chiefly concerned, as shown above (§ 28, 29), in rapidly developing or increasing the *complications*, aided, however, by obstruction of the functions of the skin; and the *secondary* or consecutive obstruction of the same organs is equally concerned in producing the *sequelæ*, as already stated (§ 29), and with the same aid. The very same organs, surfaces, or parts, which are the seats of the complications or prominent affections, may also be seats of those lesions which constitute the *sequelæ*. Indeed, the local changes described above as complications may appear so late in the disease as to be considered with propriety as *sequelæ*, while those usually denominated and viewed as *sequelæ* may supervene so early as to deserve the former appellation.

42. It has been stated above that the complications are most apt to occur in the more severe states of the distemper, whether inflammatory or malignant; and that the early affection of the kidneys—as early, probably, as the occurrence of horripilations, faintness, vomiting, pains in the back and limbs, &c., ushering in the attack, or soon after this period—by ob-

structing the functions of these organs, and thereby augmenting the contamination of the blood, increases, in the first place, the intensity and malignancy of the febrile action—of the constitutional disturbance; and, with such increase, next develops local lesions of a severe or fatal character. The state of the skin probably aids, also, in producing these effects. If this be admitted in respect of the more severe cases, it follows that the milder cases of the malady are attended by a much more slight affection of the kidneys, and that the urinary secretion does not manifest so much disorder or obstruction in these latter cases as in the former. Now this is exactly what is usually observed. But it has been very generally stated that these milder cases are most likely to be followed by renal disease and dropsy. This is partly true, and is observed to obtain in some seasons more than in others, and more especially in certain epidemic prevalences of the distemper. It may be inferred, from what I have stated, that the *sequelæ* should be the most severe after the most malignant cases; but the obstruction of the urine in many of these is such as fatally to increase the malignancy; and those who recover very frequently experience a general and profuse perspiration, or copious discharges from the alimentary canal or other parts, which are somewhat vicarious of the obstruction of the kidneys, or which derive from these organs and diminish the consecutive affection. Besides, the amount of the consecutive obstruction may not be always great in proportion to that of the primary affection; for this may be rapid in its accession, and great in its amount, in respect both of the secreting structure and of the uriniferous tubes, and yet the obstruction caused by the desquamation of the epithelium, or the accumulation or infarection of the desquamated epithelium in the tubes, may not be so great as to cause any serious change either in the blood, or, through it, in other parts. When the functions of the skin are restored, and determinations of blood towards the kidneys, and congestion of these organs, by exposures to cold and other causes, are prevented, the desquamation of the uriniferous tubes may take place gradually and without obstructing the urinary excretion, while such obstruction would very probably occur if the kidneys were the seats of vascular determination or congestion, caused by constriction of the cutaneous surface, and by the arrest of the cutaneous excretion.

43. The frequency of *sequelæ* arising out of the obstruction of the kidneys, and the severity of these *sequelæ*, often are greatest after very mild cases, and in the latent states of the disease (§ 26). So very remarkably is this the case, as respects the latent form, and so dangerous are the associated affections sometimes attending this form, that I have had reasons to doubt whether the obstruction of the kidneys was, in this form, actually consecutive of an antecedent febrile attack, unattended by eruption or sore throat, or whether it was the primary change produced by the infectious miasin, which, instead of developing either a cutaneous eruption or a sore throat, had affected the kidneys in so severe a manner as to prevent the more external evolution of the disease, and to obstruct the urinary excretion, thereby increas-

ing the contamination of the blood and the amount of its watery constituents, and occasioning other dangerous consequences, more especially the several forms of dropsy, with or without irritation or inflammation of vital organs or of serous membranes. However the renal obstruction may arise—whether *secondarily*, as usually admitted, or both *primarily and secondarily*, as now first contended for, or sometimes *primarily only*, as just suggested—the consequences of its existence upon the state of the blood must be most serious. The blood necessarily becomes altered, both as respects an increase of its watery constituents and of its saline and solid ingredients, and as regards the formation of injurious materials from the elements furnished by the processes of ultimate assimilation, of absorption, and of inhibition or endosmose, even independently of, and in addition to, the more special changes produced by the poisonous miasm, or infectious ferment, in the progress of the development of its effects and of the multiplication and dissemination of its kind. The more manifest consequences as regards the blood are an increase of the serous portion, and a diminution of the vital crasis, of the fluid and of the cohesion of the crassamentum. The globules or molecules which congregate into fibrine, either partially or altogether cease to cohere in such a manner as to form this substance, causing an apparent deficiency of fibrine, although these globules or materials which form it are actually not deficient, or are even in excess. The depression of organic nervous or vital influence, and the primary and secondary changes of the blood, diminish or otherwise affect the fibrine by depriving the globules, or the material principle constituting this substance, either partially or completely, of the power of cohering so firmly as to produce it, with its characteristic properties, more especially in the advanced stages of the distemper.

44. The consequences of an excess of the watery portions of the blood, and of the other excrementitious matters, and of the existence of other injurious products, which may be reasonably inferred to be present, although not admitting of demonstration, may be briefly stated as follows: 1st. The development of irritative fever, the pulse becoming very rapid, vital power depressed, and the skin burning, &c. 2d. Over-distention, oppression, or congestion of the vascular system, more particularly of the veins and capillary vessels in predisposed and weakened organs. 3d. With the continuance or progress of these states, asthenic irritation or inflammation, with more or less effusion, serous or sanguineous, into serous cavities, or into cellular or parenchymatous structures, according as pre-existing conditions, or previous lesions or predispositions may favour their occurrence. Thus we observe, not only as *complications* of the several stages of scarlet fever, but also as *sequelæ* during desquamation and convalescence, various modifications and associations of the pathological conditions just stated—modifications and associations caused by states of predisposition, by the dose or amount of the infecting animal poison, and by the grade and kind of alteration produced in the circulating fluids, and consecutively in serous, mucous, and cellular parts.

45. Having shown the origin of the chief *sequelæ* of scarlet fever to be obstruction of the kidneys, frequently aided by constriction of the vessels, and obstruction of the functions of the skin, but as frequently arising without such aid, it is unnecessary to add more than to briefly notice the chief affections which supervene, either from this cause, or from the disease of the throat, during desquamation and convalescence. Certain of these require merely an enumeration at this place, although they are most important as respects the amount of lesion which attends them; but these lesions, when thus produced, are more fully considered under those heads to which they more legitimately belong, namely, as consecutive alterations or diseases of the structures or organs in which they are seated. Although obstruction of the functions of the kidneys and skin, with more or less of structural change of the former, is productive of a large proportion of the *sequelæ* of this malady, still the lesions, which were situated in the throat and its vicinity during the early stages, either by their continuance, their extension, or their severity, or by their recrudescence, owing to obstruction of the depurating functions, or to exposure to cold, or humidity, or currents of air, sometimes deserve to be ranked among the most serious *sequelæ* of scarlatina.

46. A. The most important of the *sequelæ* which are produced chiefly by the affection of the throat are, *the extension of disease to the ear*, with the consequences of this extension, especially destruction of the small bones of the organ; inflammation, ulceration, and perforation of the tympanum; chronic otitis, with offensive discharge; inflammation and ulceration of the membrane lining the cochlea and semicircular canals; caries of the petrous portion, or mastoid process, or other parts of the temporal bone; and even the extension of inflammation, suppuration, or ulceration, to the membranes and substance of the brain, may supervene, and, as respects these latter changes especially, not infrequently at remote periods from the primary affection of the throat and the extension of lesion to the internal ear. When disease of the ear is so far advanced as to implicate the bone in which the organ is lodged, the consequences are serious, not only as respects the organ itself, but also as regards adjoining vital parts, the affection of which often occasions great and protracted suffering, and ultimately fatal results. (*See arts. BRAIN AND ITS MEMBRANES*, § 58, *et seq.*, and *EAR*, § 20, *et seq.*)

47. B. The extension of inflammation, and even of ulceration, from the posterior *pharynx* to the cellular, muscular, and ligamentous tissues *interposed between this part and the base of the cranium and upper cervical vertebrae*, has been noticed above in connexion with the advanced course of the malady (§ 31). But this lesion is met with not only as a complication, but also as a *sequela* of scarlet fever. In either form, in the latter more especially, it is often attended by spasm, contraction, or painful distortion of the head or neck; and in this state, the lesion has often been viewed as merely consisting of irritation, or of simple “crick in the neck,” or of rheumatism from cold, and been overlooked until it has advanced to disease of the intervertebral substance, to destruction of the ligamentous or cartilaginous structure, and even to ca-

ries of the bones at the base of the skull, or of one or more of the cervical vertebræ, with thickening of the ligaments and of the theca of the canal, and complete or incomplete, partial or general paralysis. Of this sequela I have seen several instances, and two of complete recovery, with much shortening and stiffness of the neck from destruction of one or two of the cervical vertebræ, and ossific adhesion of those adjoining.

48. *C. The parotid glands, the lymphatic glands, and the adjoining cellular tissue*, are not infrequently enlarged, congested, or inflamed after an attack of scarlatina, especially in scrofulous subjects, and in delicate persons residing in low, damp, or unwholesome situations. These are often merely the persistent or exacerbated states of the same affections which commenced at an early period of the fever; but they sometimes do not appear until much later, and although the connecting cellular tissue may be somewhat swollen, it is much more rarely the seat of diffusive inflammation than in the early stages of the malignant form of the disease. Whether existing merely as the remains of an early complication, or as a more or less remote sequela, these affections are often troublesome, especially when they advance to chronic supuration or abscess, as most frequently is the case in these circumstances; enlargement of the parotids often accompanying the other sequelæ of the disease.

49. *D Affection of the Kidneys after Scarlatina, and its Consequences.*—(a) When the pulse continues very quick or sharp after scarlatina, for a longer time and in a more marked degree than may be attributed to debility merely, or to some degree of anæmia, the continuance of irritation in an internal organ or part, or the existence of obstruction of a depurating or excreting organ, may be inferred; and the same inference may be drawn, although the febrile symptoms had subsided, from the recurrence or supervention of this state of the pulse, during or after desquamation, especially if there be also present languor and peevishness, heat and dryness of the skin, nausea or vomiting, pain or aching in the loins and limbs, drowsiness or stupor. When these symptoms appear, or if, with these, the tongue is loaded or furred, the bowels costive or irregular, and thirst increased, with or without horripilations, then should the urine and the region of the kidneys be carefully examined, and the approach of *œdema* or *anasarca* be expected, if, indeed, either be not already present. In many cases the symptoms which precede the *anasarca* are so slight as to escape observation, until *œdema* or fulness of the face, or indications of commencing *anasarca* evince the nature of the affection. In other instances the febrile commotion, with the symptoms now mentioned, are more or less manifest for a short time before, and contemporaneously with, the first appearance of *anasarca*. In every case the urine is at first scanty, often high-coloured, or turbid and albuminous; it is more rarely bloody, or of a pale red colour; sometimes it resembles water in which flesh has been washed, and there is always a frequent desire to pass it. In the less severe cases the urine is more copious, but is still turbid, and sometimes it contains numerous small fibres, consisting chiefly of epithelium, floating in it. After the

face, the feet, ankles, wrists, and hands first become *œdematous*; and in some instances the dropsy may not advance much farther; but more frequently the trunk and body generally become *anasarcous*; and in the more severe cases, or when the urine is very scanty, bloody, and albuminous, or altogether suppressed, either contemporaneously with the incipient *anasarca* or during its progress, symptoms of effusion on the brain, or in the cavities of the chest, or in the abdomen, or even in all, make their appearance, and sometimes rapidly terminate life. These rapid and complicated cases of effusion are, in some epidemics, more frequent than in others, and are more especially so in the latent form of the disease (§ 26), or when there has been no antecedent eruption or sore throat, or when the disease is apparently attacking the kidneys and serous surfaces primarily, the evolution of its more external features being thereby prevented. The vascular excrementitial plethora produced by the obstruction of the kidneys occasions effusion into cellular parts, effusion from serous membranes, and asthenic or diffusive inflammation or *œdema* of parenchymatous organs, which, with the morbid state of the blood produced by the urinary obstruction, become the more immediate causes of death, but chiefly in the severer forms and more complicated states of the disease.

50. (b) *Anasarca and its morbid associations* may occur at any period after the eruption, as well as more rarely, but occasionally, in some epidemics, even during the eruption; but commonly from the fourteenth to the twenty-eighth day from the commencement of the disease, the 21st, 22d, 23d, and 24th days being those in which it most frequently appears. The proportion of instances in which these sequelæ or reliquæ of scarlatina are observed differs much in different seasons and prevalences of the distemper. The dryness or humidity and temperature of the air, the weather, the prevailing epidemic constitution, and the treatment, must necessarily cause considerable differences in the ratio of these sequelæ at different times. Dr. WILLIAMS states that at HERIOT'S Hospital, in 1832 and 1833, nine cases of dropsy occurred in forty-five; and that in the London Foundling Hospital only three were affected with dropsy out of 100 cases of scarlatina. Mr. HAMILTON says, that a larger proportion of the numerous cases of scarlet fever which he attended in Edinburgh in 1832 and 1833, became dropsical. According to my observations, dropsy from obstructed kidneys, in all its forms and associations, has been a common consequence of scarlet fever for several years up to 1848, during which year it was most frequent and most complicated. But it appears to have been more or less frequent in all epidemics of this fever which have been fully described; the two occasions of its rare occurrence just mentioned being the most remarkable with which I am acquainted.

51. (c) *The origin* of this dropsy was formerly ascribed to the state of the skin, and especially to obstruction of transpiration from this surface, in connexion with loss of tone of the capillaries supplying the parts in which the effusion occurred. More recent researches have shown that, however these states may aid in the production of these sequelæ, the affection

of the kidneys should be viewed as the chief source of the effusion, and even also of the asthenic or diffusive inflammation and irritation of one or more vital organs sometimes associated with effusion into the shut cavities, whether occurring as complications during the eruption or as sequelæ (§ 28, 41).

52. (d) In the most favourable cases, œdema, or slight anasarca, may only occur and be ushered in, as already stated (§ 49), with acceleration of the pulse, scanty urine, and other febrile symptoms. But the anasarca may be excessive; or, even without being excessive, effusion of serum may also take place in the *brain*, in both *cavities of the chest*, in the *pericardium*, or in the *peritoneal cavity*. It more rarely is confined to one cavity than extended to nearly all, although in different degrees. As far as I have observed, when it takes place into the pleural cavities, a slight effusion is not infrequent into the pericardium also; and the *lungs* and *pleura* are then sometimes *inflamed*, but more frequently *congested*; inflammation rarely advancing farther than the state of splenization, but usually evincing the appearances of congestive or diffusive inflammation.

53. (e) Effusion into the ventricles, or between the membranes of the *brain*, may take place without effusion into any other cavity, and even without anasarca; but it may also be associated with one or more of such affections. When it occurs as a sequelæ of scarlatina it is generally not so rapid or acute as when it appears as a complication, nor is it so frequently attended by convulsions; although the stupor or coma may be as profound, and the organs of sense as much affected.

54. (f) Effusion into the *cavities of the chest* is generally preceded by anasarca, by congestion or inflammation of the lungs or pleura, or of both; and is sometimes attended by œdema of the lungs, and by effusion into the pericardium. The affections of the lungs and pleura, with effusion, are the most frequent internal complications of the anasarca, or remote consequences of the renal obstruction, effusion into the peritoneum being very much less common. The associated affections of the lungs and pleura are generally far advanced before they are fully manifested—are more or less latent in their early stages, and are seldom confined to one side, although one lung or pleura may be more diseased than the other. Dropsical effusion into the *peritoneal cavity* is generally preceded by œdema or anasarca, being in some instances an association of the latter; or by diarrhœa. It is occasionally attended by signs of inflammatory irritation of the membrane, but these signs may have been wanting or obscure, although indications of general peritonitis with effusion are found upon dissection; the early supervention of effusion probably removing the more severe local symptoms, as well as partially resolving the attendant inflammatory state.

55. (g) *Renal disease and dropsy*, as sequelæ of scarlet fever, may occur in patients of any age, but much more frequently in *children* from two or three years of age up to thirteen or fourteen. They are most common in the ill-clothed and ill-fed, and in those who live in low cellars or on ground floors, and in cold, damp situations, or who are exposed to cold or vicissi-

tudes of weather soon after or during desquamation. They are much more rare in the children of parents in comfortable circumstances than among the poor; from a fourth to a third or even more of the cases of the latter being probably thus attacked, especially in some epidemics, and late in autumn and beginning of winter. There is probably hardly a case of dropsy after scarlatina, or of inflammation of an organ or serous surface, particularly when associated with dropsy in connexion with this disease, that has not its origin in renal obstruction, although the interrupted functions of the skin, and the antecedent states of the blood, caused by the infectious miasm, may be admitted as concurrent causes. The kidneys are, however, so generally implicated, as I have contended above (§ 24, 28, *et seq.*), in all the stages of scarlatina, both primary and secondary, as to allow the inference, that the affection of these organs may exist in a grade sufficient to occasion indications of its presence, if attentively inquired after, and especially the symptoms mentioned above (§ 49), with more or less alteration of the quantity, appearances, and constituents of the urine, without producing such obstruction of this excretion, or such change of the constitution of the blood, as to be followed by dropsical effusion, this result supervening chiefly in the more acute and complete states of the affection of these organs. The consecutive inflammations, so frequently associated with the dropsy, also chiefly depend upon the renal obstruction, aided, however, as just stated, and as already more fully shown (§ 44, 45), by the states of the skin and antecedent alterations of the blood.

56. (h) The renal and dropsical affections consequent upon scarlatina, especially when severe, are often followed, during convalescence from them, by more or less *anæmia*; the alteration of the constitution of the blood—the contamination of the blood, directly and indirectly, by the infectious miasm, and consecutively by the obstructed excretories—not only impairing the vital crasis of this fluid, but also hastening the changes in, and the destruction of, the red globules or hæmato-globulin, while the primary and secondary functions of assimilation—the formation of healthy chyle and the conversion of chyle into blood, or of the chyle-globules into blood-globules—are slowly and imperfectly accomplished, owing to the debilitated state of the several assimilating organs.

57. (i) *Inflammation*, generally of a diffusive or asthenic kind, and attended with more or less effusion of a turbid serum when the serous surfaces are implicated, not infrequently is associated with the consecutive dropsy; but it also, although much more rarely, occurs independently of any antecedent or attendant œdema or anasarca. When thus complicated, and even when occurring simply, it is generally owing to the state of the blood, arising, as shown above (§ 43, *et seq.*), from the primary and consecutive changes of this fluid, and the existing disturbance of the urinary and cutaneous excretions. The organs and surfaces which are most liable to be thus secondarily inflamed, either in connexion with, or independently of, dropsical effusion, are the *membranes of the brain*, the *lungs* or *pleura*, or *both*, the *pericardium*, the *peritoneum*, the *synovial membranes*,

the *parotid glands* and the *integuments*; and it is not rare to find not merely one, but two or more of these to be affected in the same case, more especially when the affection is associated with *dropsy*, and with manifest disorder of the *kidneys*, and with *albuminous* or otherwise *morbid urine* (§ 60, *et seq.*).

58. (k) Enlargement and chronic inflammation of the *parotid glands*, with effusion of serum, lymph, and puriform matter into the surrounding *cellular tissue*, and engorgement or inflammation of the *lymphatic glands*, are among the most frequent sequelæ of scarlet fever, and are often associated with œdema or anasarca, or with inflammation of the organs and parts just enumerated, and not infrequently with chronic disease of one, or of both ears, producing offensive discharge, perforation of the tympanum, and caries of the bones of the ear. *Chronic otitis* following scarlatina is generally of long continuance, sometimes occasioning caries of the mastoid cells and process, and even more extensive disease of the temporal bone. In some cases the disease extends to the membranes and sinuses of the brain, and even to the brain itself, as shown at another place (*see art. BRAIN*, § 58, *et seq.*); but these results seldom supervene until after several months, or even years.

59. IV. STATE OF THE BLOOD IN SCARLET FEVER.—Notwithstanding the chemical analyses which have been made in Germany and France, of the blood taken from the subjects of scarlet fever, it is doubtful if any real or useful progress has actually been made in this department of pathological research during the last century and a half. The analyses, especially as regards this fever, have been few, and the results, in connexion with the visible appearances and physical states of the blood, and with the stages and state of the disease, have not been stated with the least degree of precision. As regards the appearances and physical states of the blood, it may be remarked, that these depend upon the type of the fever, or the states of vital power and vascular action, and vary most remarkably with these states, as observed in other fevers and maladies attended by contamination of the circulation, and as described in the articles BLOOD (§ 115, *et seq.*), FEVER (§ 93, 110, 520), and PUERPERAL FEVERS (§ 215, *et seq.*). It is chiefly in the more inflammatory types of scarlet fever that blood has been taken and its appearance observed. In the more malignant forms blood has rarely been taken from a vein, and on the few occasions on which this has been done it has presented similar characters to those stated above (§ 43, 56), and to those mentioned in connexion with the fevers just referred to, and in the article BLOOD (§ 78, *et seq.*). ANDRAL and GAVARRET analyzed the blood of three persons in scarlet fever, and LECANT in two cases; but the results which these analyses furnish are not materially different from those obtained from the analysis of the blood of a healthy person. It is chiefly in the more malignant, or putro-dynamic type, and in the advanced course of the malady, that the blood presents morbid appearances such as are stated in the articles referred to; but in these circumstances it has not been chemically examined.

60. V. THE URINE.—The *urine* in scarlet fe-

ver presents the most important changes as respects the pathological states characterizing the several stages of the disease, and as regards the treatment of these states. These changes are various, not only in different cases, but also in the same case at different periods, and even in the course of a few hours, and hence have arisen the opposite or varying statements respecting this excretion which have hitherto appeared. The appearances and constitution of this fluid, moreover, have been very imperfectly investigated during the early stages of the malady, and the symptoms connected with the kidneys at these periods very insufficiently investigated, if not entirely overlooked, by most observers and writers on this disease.

61. The *urine* is always paler in children than in adults, and hence the deep colour of it in the former should attract more particular attention when observed in them, the most frequent subjects of scarlatina.—(a) The *urine* at the commencement, and during the *early stages* of scarlatina, is always scanty and very high coloured, and often of a deep red hue when there is much fever. It generally has an acid reaction in the *mild and inflammatory* or *sthenic forms* of the disease. In the *septic* or *asthenic types*, and especially when the affection of the throat or the eruption presents malignant characters, the *urine* is either neutral or alkaline and very turbid; sometimes it contains blood-globules; and is always very scanty, although in these, as well as in the more sthenic forms, it is voided frequently, or is attended by dysuria or scalding. In most instances, even very early in the disease, it rapidly becomes ammoniacal; but in the more malignant states it deposits a viscid, whitish sediment at an early period, consisting of the earthy phosphates and mucus, and it contains urate of ammonia and uric acid. When the *urine* is of a dark brown colour and turbid, or deposits a loose sediment of this hue, the presence of partially decomposed blood-globules in it may be inferred. Albumen is also sometimes present in the early stages, but in various or slight quantity; and it may be detected, or even be considerable, at one period, and not be found some hours afterward, and yet be soon again present.

62. (b) During the *advanced stages* of the mild and more *sthenic forms* of scarlatina, the *urine* becomes more abundant, of greater specific gravity, from the abundance of saline matters, and presents the characters usually observed during the decline of inflammatory and continued fevers. In *asthenic*, *septic*, or *malignant cases*, the *urine* becomes, with the progress of the malady, of a dark brown or yellowish colour, is very scanty, and of a specific gravity varying from 1020 to 1025. It has an alkaline reaction, with a disagreeable ammoniacal odour, and it occasionally contains blood and mucus, or partially-dissolved hæmato-globulin, either diffused or in flocculent deposits, but rarely any or much albumen. It throws down a dirty white sediment, consisting of earthy phosphates, urate of ammonia, urate of soda, and mucus, with other animal matters. In these cases particularly, and less rapidly in others, the *urine* becomes more decidedly ammoniacal and offensive.

63. (c) When the disease is *complicated* in the *early stages* or in its *advanced progress*, the *urine*

is even still more changed from the natural state than above stated. If the attack be malignant or complicated from the commencement, and more especially if there be coma, or signs of inflammation of the lungs, pleura, or other internal organ or surface, with or without effusion, or external œdema, or if these complications occur in the *latent* and *non-eruptive* forms of the disease, the urine will be either *bloody* or *albuminous*, and scanty, or it will be found to have been for some time previously either altogether *suppressed* or remarkably scanty, and high-coloured or bloody. Sometimes it appears like to the washings of meat, and is voided either frequently or involuntarily; and in others *hematuria* is decidedly present. In some cases urine has not been passed for many hours, and yet little or none has appeared to be retained in the bladder, indicating an arrest of the secreting function, owing either to suspension of the organic nervous influence of the kidneys, or to extreme congestion, or to both. In these cases, aching in the loins and lower limbs, nausea and vomiting, with general turgescence or œdema, headache, &c., may or may not be present, with one or more of the complications described above (§ 27, *et seq.*); but the pain and aching of the loins and limbs are not so great as usually observed in acute suppurative nephritis, although sufficiently indicative of suspended function and congestion of the kidneys, especially when viewed in connexion with the state of the urine and the sympathetic phenomena. The connexion of the renal affection, of the morbid and deficient urine, of the states of the blood and of vascular action, and of the consecutive inflammatory irritation, serous effusion, &c., with each other, and even the usual procession of these diseased states, in the course of scarlet fever, will be more readily understood by a due and practical consideration of this topic, and of what I have already said respecting it (§ 28, 41).

64. (*d*) During *desquamation* the urine generally contains albumen. SIMON remarks, that observations regarding the presence of albumen during this period are so contradictory as to render it a matter of interest to have the matter settled by farther researches. "We have dropsical symptoms with albuminaria, dropsical symptoms without albuminaria, and albuminaria without dropsical symptoms. SOLON found albumen in the urine in twenty-two out of twenty-three cases of scarlatina. On the other hand, PHILIPP observed in Berlin at least sixty cases in which albumen was not detected."

65. In most cases, the urine is of a straw colour in this stage, contains mucus-corpuscles, and is turbid, owing to this circumstance, and to the quantity of epithelium, either in single scales, or in fragments of a connected series of scales, swimming in it. The sediment contains much epithelium, occasionally formed by lymph into cylindrical, fibrinous casts of the tubes, and crystals of lithic acid. These changes arise from the desquamation of the uriniferous tubes, and are sometimes antecedent to the desquamation of the cuticle. This early desquamation of these tubes furnishes a proof of the earlier and more constant affection of the kidneys than has hitherto been supposed, and is evidence of the important part performed by the pathological conditions of these organs at the

commencement of the malady for which I have contended (§ 28, *et seq.*). In favourable circumstances, no albumen is found in the urine, in most cases, during desquamation and convalescence, or the quantity is slight. But it is found in small or moderate quantity, in a few instances, without either inflammation, or œdema, or dropsy in any form being present. In some of these a slight fibrilla is observed, and soon passes off without either of these results. When, however, dropsy or inflammation follows scarlatina, the urine becomes albuminous generally with, or previously to, the febrile symptoms ushering in, during convalescence (§ 49), the dropsy or inflammatory affection, and continues to present this state, more or less manifestly, during the persistence of these sequelæ. It is often most remarkable in those cases of dropsy or inflammation which are consequent upon the latent and non-eruptive forms of the disease; and is sometimes farther attended by disease of the glands of the neck. When the urine becomes very albuminous during desquamation and convalescence, then acute febrile symptoms, and inflammation of some internal organ or part, or dropsical effusion, or both, either pathological state preceding the other, soon supervene, and rapidly assume a severe or dangerous form. The urine, during this stage, often contains an increased quantity of the animal extractive matters usually existing in this excretion.

66. VI. APPEARANCES AFTER DEATH.—These differ remarkably, according as this issue takes place at an early or an advanced stage, and more especially according to the nature of the local affections complicating or following the disease. In the malignant form, decomposition follows dissolution sometimes with remarkable rapidity.—A. When death occurs at an *early period*, (*a*) the *surface* of the body appears either of a livid or of a violet coloured hue, generally in patches, when the eruption was present; but not infrequently all traces of the exanthem have disappeared. Upon dividing the integuments, the vascular rete is usually found more than commonly injected, and the subjacent cellular tissue is less turgid than during life.—(*b*) Generally, also, the redness of the *mouth* and *pharynx* disappears after death. The *tonsils* present different states, according to the prevailing type of the disease. They are frequently enlarged, softened, pultaceous, or gangrenous; and sometimes they are covered by a soft, membranous exudation. The mucous surface of the *pharynx* and *œsophagus* is considerably softened, and that of the former is occasionally ulcerated, softening and infiltration of the adjoining parts being manifest. The *palate* sometimes is partially destroyed by sphacelating, or septic ulceration, especially when the tonsils are gangrenous, or the pharynx ulcerated and softened.—(*c*) The *digestive mucous surface* varies with the character of the fever. In the more asthenic or malignant cases, it is softened, discoloured, and readily detached. Generally, BRUNNER'S glands are more developed than natural, and the agminated glands of Peyer more tumid. The *mesenteric glands* are only occasionally enlarged and more vascular. The *spleen* is frequently enlarged, softened, and friable; sometimes it is almost pultaceous. The *liver* and *lungs* are often more or less congest.

ed, and the *blood* found in the auricles of the heart and veins is dark, semi-fluid, or grumous; and, in the malignant cases especially, this state of the blood is still more remarkable. The bronchial mucous membrane is injected with dark blood, and the *bronchi* often contain some mucus.—(d) The *kidneys* are always congested, tumid, and often of a dark mottled hue externally; while an increased vascularity, varying in degree, in the different structures, is found at this period of the disease, upon dividing the organ longitudinally. The urinary *bladder* is commonly contracted, and contains little or no urine.

67. B. When scarlatina presents any of the *primary complications*, or prominent affections mentioned above (§ 27, *et seq.*), during the second stage especially, the appearances are very different from those just stated; for, while those exist more or less manifestly, others are superadded.—(a) If the patient have been the subject of cerebral complications, the *membranes*, and even the *substance of the brain*, present increased vascularity, with some serous effusion between the membranes, especially at the base of the brain and in the ventricles, particularly in those cases in which the urine has been very scanty or suppressed.—(b) When the patient has been suddenly destroyed by the extension of the pharyngeal disease to the epiglottis, *larynx*, and *trachea*, considerable œdema of the glottis, between the chordæ vocales, &c., and general tumefaction of these parts, sometimes with the effusion of a dirty friable lymph upon the surface, partially detached, or but slightly adherent, and occasionally spreading down a portion of the trachea, are observed. This state of parts was seen by me, at an early period of my practice, in a man, aged about sixty, who died of scarlatina with sore throat in twenty-four hours from the commencement of the disease, owing to the extension of the local affection to the larynx. In these cases, the *lungs* are always found remarkably congested with black fluid blood, and the surfaces of the *bronchi* are dark or livid, and injected, the tubes often containing a bloody mucus.—(c) When the *parotids* are much enlarged, and the neck tumid, and the surrounding *cellular tissue* is the seat of asthenic or spreading inflammation, then these glands, and generally the lymphatic *glands*, are found enlarged, injected, and softened, and the adjoining cellular tissue is infiltrated with a sanguineous serum, or lymph, or puriform matter, each of three several kinds of morbid effusion predominating in different parts of the neck in the same case. If the patient have lived a few days, the morbid fluids infiltrating the cellular tissue have sometimes contaminated, and ultimately destroyed the vitality of this tissue; until the sphacelation which results has left the muscles and vessels of the neck almost as if dissected, and has even spread to the sternum. In a case to which I was called, the gangrene advanced as far as the *pectoral muscles*; but death generally takes place before disorganization proceeds so far as this. The changes observed in the *ear* and its vicinity have been already noticed (§ 32, 46); but these are chiefly of the nature of spreading inflammation along the Eustachian tube to the internal ear, and sometimes also to the mastoid cells, cochlea and semicircular can-

nals, and are occasionally remotely followed by disease of the bone containing these parts.

68. (d) When *pneumonia* complicates the disease both lungs are generally affected, although in different degrees, and the appearances vary somewhat with the type of the fever. Most frequently the lungs present in various grades, in different parts, but most remarkably in the posterior aspect, congestion, with effusion of a serous or fluid lymph, or with a more firm lymph in some places, giving rise to varied grades of splenization, death or recovery taking place before the change can proceed farther. The *pleura* is frequently either decidedly inflamed, or contains fluid with or without manifest inflammatory changes, and often in connexion with pulmonic congestion or inflammation. In the more sthenic forms of the disease, lymph, in some instances, is exuded, with or without, most frequently with, serous effusion, and sometimes with adhesion of the opposite surfaces by bands of fibrinous lymph, or more continuously.—(e) In the asthenic or malignant states, the marks of inflammation are less obvious, but the effusion into the pleural cavities is greater; and similar changes are sometimes observed, also, in the *pericardium*.—(f) Inflammatory appearances, generally with a turbid, serous effusion, and occasionally with slight or partial adhesions, are sometimes found in the *peritoneum*.—(g) The synovial membrane of the *joints*, in a few instances, has presented marks of inflammatory action, with more or less effusion into its cavity.

69. C. When death occurs during desquamation, or subsequently, owing to either of the *sequela*, or secondary complications, noticed above (§ 41, *et seq.*), the appearances differ but little from those just mentioned, with reference to their respective affections, excepting that they either consist, in great measure, of dropsical effusion of greater or less extent and amount, or are associated with other lesions of an inflammatory, congestive, diffusive, or of a mixed kind.—(a) The most frequent changes exist in the *kidneys*, and in the shut *cavities* and *cellular tissue*, in the form of effusion, often with inflammatory appearances. The *kidneys*, in the more rapidly fatal cases, and in those which occur at an early period of desquamation, are frequently injected, or congested, mottled or marbled externally; and internally, the constituent tissues present various appearances, certain of them being very vascular, others pale or anæmic. Hence the substance of the organ often is mottled, and generally not much increased in bulk, unless when the congestion and vascularity predominate. On examination by the microscope, the Malpighian bodies are often seen to be pale, and the surrounding capillaries injected, while the tubuli are filled with epithelium cells or scales. In those cases in which dropsy occurs later in the course of recovery, and which are of longer duration, the *kidneys* generally present somewhat different appearances, which more nearly approach those observed and described in the articles DROPSY (§ 13) and KIDNEY (§ 23, *et seq.*), when treating of the changes connected with *albuminaria*. Although the surfaces of the organs are sometimes mottled, and more or less congested, their structures, on division, are pale, especially in spots, as if anæmic, or from the deposition of

lymph or albumen, and approach the characters of granular degeneration. The Malpighian bodies and the surrounding capillaries appear pale and bloodless under the microscope, and the tubuli are filled, in various places, with epithelium cells, and in others with what appears to be a mixture of albuminous matter or lymph, and oil-globules, or of these with detached epithelium.*—(b) As respects the *cellular tissue*

* After this article was sent to, and while it was passing through the press, Dr. G. JOHNSON's very excellent article on the kidney, in the *Cyclopædia of Anatomy and Physiology* (art. REN), was brought to my notice, as well as his valuable paper in the Transactions of the Medico-Chirurgical Society (vol. xxx.), in both which places the morbid anatomy of the kidneys after scarlatina is ably described. Dr. G. JOHNSON, who was the first to detect oil or fat in the kidneys, in granular disease of these organs, states that he has not found oil in the urinary tubes after scarlatina. I observed some oil-globules in two cases of a more than usually chronic duration, as stated above; but Dr. JOHNSON, who has examined more of these cases than I have, without meeting with this change, justly considers the scarlatina affection of the kidneys as very distinct from the granular disease of the kidneys described by Dr. BRIGIT; and while he denominates the former "*acute desquamative nephritis*," he terms the latter "*fatty degeneration of the kidneys*." I believe that the more acute or rapidly fatal cases of dropsy or inflammation after scarlet fever rarely present any oil-globules in the urinary tubes; but that, when the scarlatinal nephritis becomes chronic, and is followed by change of structure, then oil-globules are found in the tubes. In one of the cases in which I observed them after scarlatina, the man who was its subject was between thirty and forty years of age, and was probably irregular in his habits, the consequent anasarca having been of considerable duration.

"*Acute desquamative nephritis*" of Dr. G. JOHNSON occurs frequently as a consequence of scarlatina, and is occasionally produced by other animal poisons, as that of typhus fever, small-pox, or measles. I have noticed, in the article KIDNEYS (§ 56, *et seq.*), the connexion of this form of nephritis, which I have named "*consecutive or secondary atrophic nephritis*," with febrile and other diseases, and the various circumstances of this connexion. In relation to scarlatina, I have contended above that it occurs either *primarily or secondarily*; and that often there is thus a "*primary scarlatinal nephritis*" and a "*secondary scarlatinal nephritis*" (see, also, art. KIDNEYS, § 56), or inflammation of these organs either associated with the scarlet fever or occurring as a consequence of this fever. Dr. G. JOHNSON describes the nephritis *consequent upon scarlatina* as follows: "The kidney in these cases is enlarged, apparently by the deposit of a white material in the cortical substance; the vessels in the cortical portion where they are not compressed by this new material are injected, and of a bright red hue; the medullary cones are of a dark-red colour, in consequence of the large veins which occupy these portions of the gland being distended with blood. The appearance of the entire organ is quite that of a part in a state of acute inflammation."

"When the kidney has been in a softened condition before the occurrence of the inflammatory disease, as often happens in elderly persons, the lobules on the surface appear larger and coarser than natural; the veins, being less compressed than when the natural texture of the kidney is firmer and more unyielding, are much distended with blood, so that the entire organ is of a dark slate colour."

"On a microscopic examination, the convoluted tubes are seen filled, in different degrees, with nucleated cells, differing in no essential character from those which line the tubes of the healthy gland. The Malpighian bodies are for the most part transparent and healthy, but the vessels of the tuft are sometimes rendered opaque by an accumulation of small cells on their surface. Some of the tubes contain blood, which has doubtless escaped from the gorged Malpighian vessels. There is no deposit exterior to the tubes."

"The condition of the urine in these cases is clearly indicative of the process going on in the kidney. After it has been allowed to stand for a short time, a sediment forms; and on placing a portion of this under the microscope, there may be seen blood-corpuscles, with epithelial cells in great numbers, partly free and partly entangled in cylindrical fibrinous casts of the urinary tubes, and very commonly numerous crystals of lithic acid are present."

"As the disease subsides, which, under proper treatment, it usually does in a few days, the blood fibrinous casts, and epithelial cells diminish in quantity, and finally disappear; but traces of the casts may be seen some days

and the *serous cavities*, it need only be added that the former is generally more or less loaded with serum; the latter sometimes contain effused fluid, with or without slight or marked inflammatory appearances, although these latter are not so frequent or so marked as in the primary complications noticed above (§ 27, *et seq.*). The effusion, as well as inflammatory changes, may exist only in one of the cavities, or may extend to two or more. Both pleural cavities are generally implicated, but sometimes in different degrees; and the *parotid* and *lymphatic glands* are often enlarged, and the *joints* occasionally inflamed.—(c) I have likewise seen the *vertebræ* of the neck, their ligaments and intervertebral substance seriously affected, caries of the former with chronic inflammation, thickening, &c., of the theca supervening, and occasioning cervical paraplegia or general palsy (§ 47).

70. VII. DIAGNOSIS.—Scarlatina can be confounded only with measles (*Morbilli*), or with the mixed or hybrid disease which I have described by the name of *Rubeola*.—A. Dr. R. WILLIAMS has stated that the earlier appearance of scarlatina after exposure to infection, and of the eruption after the primary fever, may serve to distinguish this disease from measles. But, although these circumstances frequently obtain, and may be viewed as the law, still the exceptions furnished by different epidemics and by individual cases are so numerous, that but slight importance should be attached to them. This will be still more apparent upon referring to what I have adduced respecting the periods of *latency* in these maladies in the article on INFECTION (§ 31, 32). The appearances of the efflorescence in both maladies, and the signs furnished by the inlets to the digestive and respiratory passages, and the states of the urinary functions, are chiefly deserving attention in establishing a diagnosis between *scarlet fever* and *measles*. In the former, the tongue presents redness of the point and edges and strawberry surface, and the fauces more or less redness at an early period, while the tonsils are enlarged, or soon afterward are ulcerated. There is seldom, or very rarely, sneezing or coryza, both which usher in measles; and in the latter the affection of the throat is either altogether absent or very slight, while cough is often severe. The *period* at which the *eruption* appears differs much with the constitution of the patient, the season, and character or type of the prevailing epidemic, as regards both maladies; and although deserving of mention as respects the description, cannot be depended on in the diagnosis. In scarlatina the patches are large, and the surface covered by them generally ample; but in measles the eruption consists of small circular dots like flea-bites, and when most confluent the patches or clusters are small. The colour of the rash is that of a vivid red in scarlatina, while it approaches a raspberry hue in measles. The former can hardly be mistaken for *roseola*, which is preceded by very little fever, and rarely by any affection of the throat, and the rose-coloured and irregular spots of which differ much from the large patches of scarlatina. In most cases, the

after the urine has ceased to coagulate, on the application of heat or nitric acid."—(*Cyclop. of Anat. and Physiol.*, art. REN.)

eruption of scarlet fever is more general than that of other exanthematous diseases, while the fever is more persistent, and does not abate with the development of the eruption, and but slightly, or not at all, with the disappearance of it, but often continues many days, or even some weeks afterward, or is sometimes considerably exacerbated after having abated. In measles the fever usually subsides with the disappearance of the rash.

71. *B. The kidneys* are not nearly so liable to be affected in measles as in scarlet fever, in which they are remarkably disordered, both primarily and secondarily, and the urine is either partially or altogether suppressed, or otherwise morbid. The infectious miasm of scarlatina has a special influence on the states of the kidneys, as shown above (§ 23, *et seq.*), and thereby often induces several secondary affections not observed to follow, or very rarely, the other exanthematous fevers, more especially dropsies, diffusive or congestive inflammations with serous effusion, &c., affections of the joints, gangrenous erysipelas, &c.

72. *C. The diagnosis of the primary fever of scarlatina* is often difficult or impossible, if the anginous affection be absent, and if no eruption have appeared. The circumstance of the disease being in the same family, house, or immediate vicinity; the states of the tongue, throat, flexures of the joints, and urinary excretion, and the character or type of the fever, will sometimes aid the diagnosis, although the severity of the disease, the affection of the head, the convulsions or delirium, the vomitings and thirst may lead to the belief that the first stage of meningitis is actually present. In most cases, however, of this period of scarlatina, the severity of the vomiting; the pains in the back and loins; the remarkable scantiness and morbid appearances of the urine; the burning heat and dryness of the skin; the enlargement of the parotids, or the existence of some complication; the great rapidity of the pulse, and the acuteness of the attack, should induce suspicions of scarlatina, especially in the circumstances just mentioned, although neither eruption nor throat-affection is present (see above, § 4, and *art. MEASLES*, § 48).

73. VIII. *PROGNOSIS, &c.*—It has been attempted by some writers to impart an *ad captandum* precision to the prognosis of scarlet fever that the subject does not admit of, by calculating the proportion of deaths in this disease; but it is obvious that the rate of mortality will vary with the several forms, types, complications, &c.; with the combinations of predisposing causes, and with the treatment.—*A.* In the simple, mild, and more sthenic types of the malady, the prognosis is favourable, although the contingency of secondary disease should be taken into account, yet this may be generally guarded against and prevented. When the malady is complicated, irregular, malignant, or asthenic, then the danger is considerable, although numerous circumstances may indicate either a diminished or an increased risk. It is chiefly from the existence of certain *symptoms* that danger is to be inferred; but there are *circumstances* connected with the pre-existing state of the patient which often increases the risk, as the first period of *dentition*, the period of *weaning*, the *cachexia* produced by

unwholesome or insufficient food; a bloated, leucophlegmatic or plethoric habit of body, and the *pregnant* and *puerperal* states. In some epidemic visitations, and in some seasons more than in others, pregnant and especially puerperal females are liable to be attacked by scarlatina; but the liability is not so great as the danger to those who are infected; for the *pregnant* are prone to abortion, and when this occurs the disease often assumes a most dangerous form; and if the disease occurs soon after *parturition*, recovery rarely takes place, more especially as observed in some epidemics. In these latter circumstances the scarlatina often assumes the appearance of, and can hardly be distinguished from, the most malignant form of puerperal fever. Scarlatina thus occurring soon after *parturition*, has been described as follows by MALFATTI: "It usually attacked patients immediately after delivery, and caused the utmost prostration of strength and slight pain in the throat. The eruption assumed either the miliform or levigated character, and was of a dark violet hue. The strength of the patient now sank rapidly, and to a burning heat succeeded coldness of the extremities, and a very frequent and small pulse. To these symptoms were added great anxiety, hæmorrhage from the nose, and a fetid and copious lochia." He adds, that the infected in this state all died, "*qualiscumque adhibita fuerat medela.*"

74. *B. The symptoms* which more especially indicate danger are the occurrences of convulsions at or soon after the attack, or of delirium on the first and second day. In these cases the child often dies, as remarked by Dr. R. WILLIAMS, on the third or fourth day, and the adult on the eighth or tenth; but this issue sometimes in these takes place even earlier, more rarely later. A severe affection, or sphacelating or foul ulcerating state of the fauces and tonsils; a brown state of the tongue, or a clean, raw tongue, or a glossy state of the tongue or throat, with a rapid, fluttering pulse, are very unfavourable symptoms, as also is a sudden fading of the eruption, or the changing of it to a livid hue, or the appearance of petechiæ or of purple spots. The supervention of coma, or of pericarditis, or of double pneumonia, or pleuritis, or peritonitis is unfavourable, but not necessarily fatal; but the danger of these, as well as of all the other primary and secondary complications of the malady, is remarkably heightened by suppression of *urine*, or by a very scanty or bloody state of this excretion, and by other indications of serious affection of the *kidneys*. Persistent vomiting; a severe or obstinate diarrhœa; acrid or excoerating discharges from the mouth, throat, and nostrils, with or without hæmorrhages; hæmaturia or melæna; the association of two or more of the complications or local affections already described, especially in a severe form; the appearance of diffusive inflammation of the cellular tissue in the vicinity of the parotids, and extending down the neck, or of extensive abscesses, or sphacelation, in this situation, are very unfavourable occurrences. The same may be said of affections of the joints, erysipelas or local gangrene, and affection of the cervical portion of the spine, with consecutive caries of one or more cervical vertebræ. But these are not necessarily fatal, although very dangerous; even

from the last of these lesions recovery may take place, a result which was obtained in two cases which were under my care, both of which are now alive and quite well, excepting a stiff and shortened neck.

75. *C. Dropsy*, in the form of anasarca, or taking place in any of the cavities, in connexion with scarlatina, varies much in danger with the season and the prevailing epidemic, with the seat of effusion, with the nature of other associated morbid states, and more especially with the states of the kidneys and urinary excretion. The occurrence of anasarca *during the eruption*, or of effusion in any shut cavity at this period, with or without inflammation, is an indication of danger, more especially if the urine be very scanty, very deep-coloured, or suppressed. Anasarca occurring alone *during desquamation or convalescence*, although the urine is albuminous, is generally cured if no farther complication take place, and if the urine is not very scanty, or very albuminous, or bloody. But if the urine assume either of these states in a remarkable degree, the supervention of most dangerous internal effusion or inflammation, chiefly of the meninges of the brain, of the pleura, pericardium, or peritoneum, or of the lungs, &c., may be expected. The danger and the frequency of these secondary complications of scarlatina, as well as of the primary associations, vary much in different epidemics, and with the numerous causes or occasions concurring to render the infection intense, or to re-enforce the operation of the poisonous miasm, and with those more especially which are about to be mentioned (§ 84, *et seq.*).

76. IX. CAUSES.—i. THE SPECIFIC CAUSE OR POISON.—A. Scarlet fever is *caused* by a *miasm* or *emanation* from a person already the subject of this disease; but the exact and intimate nature of the miasm, and the origin of it, are unknown. We know only the effects or phenomena which this cause produces, and most of the circumstances which favour its operation; and we farther know that, however these effects vary in severity, in form, or in character, they are always of a specific nature, the seminum attending them multiplying and disseminating itself, and spreading its kind whenever circumstances favour the propagation. Upon these circumstances the prevalence of the malady chiefly depends; for they favour the operation of the specific poison or infectious miasm which produces it: 1st. By predisposing the system of individuals to the invasion of this miasm. 2d. By concentrating and increasing the dose or quantity of the poisonous emanation invading the frame. During many ages, and especially when the earlier accounts of the malady were furnished, either the combinations of these predisposing circumstances were greater at distant intervals, or their absence was more complete in these intervals than at the present day, or the infectious or poisonous miasm was entirely absent, or remained latent or concealed for prolonged periods. Either of these conditions may have existed; or the infection, having produced its effects on all who had come within its sphere, had ceased to spread, and had ultimately disappeared from a place for a longer or shorter period, until it was introduced by a poisoned or infected person, or by contaminated articles or fomites. This latter

circumstance—this reappearance of the malady in a place long entirely exempt from it—suggests the following questions as to its origin: 1st. Whether the disease is caused only by a specific seminum which had originated at some unknown period, and, having infected one and more persons, and subsequently all who were predisposed to the infection, had then ceased to produce its effects, but was retained by substances capable of preserving it under certain favourable circumstances until it was again brought to act on those predisposed to its influence? 2d. Whether the disease is always thus perpetuated by the preservation of the infectious seminum by individual, or rare, or scattered cases, and by fomites; or is it produced, *de novo*, by the combination of those causes in an intense form which are usually viewed as concurrent and predisposing causes, and, being thus produced anew, is then propagated by the infectious emanation proceeding from those thus attacked?

77. I incline to the first of these opinions, because we have no sufficient evidence of the reproduction of this malady by the combination of the causes usually favouring it, predisposing to it, and rendering attacks of it malignant or complicated; and because an infectious seminum, as in the case of small-pox, may be preserved, propagated, and become epidemic—may almost disappear for a time, and then unexpectedly break out—without the means of its preservation, the sources of its infection, or the causes of its prevalence and of its multiplied effects being made manifest, or even admitting of solution on many occasions. But the difficulty of tracing infection to its sources on all occasions, in this and in other infectious maladies, is by no means an argument against its existence; for causes are often inferred from their effects with greater certainty than from some other proofs upon which firmer reliance is often placed. The laws of infection, and the numerous circumstances connected with the sources, the preservation, and the dissemination of infectious semina, admit not of a rational doubt of the perpetuation of these semina, although their effects may be sparingly or rarely disseminated, or even developed, after long intervals. Indeed, much of what is known of these favours a firm belief in this source of scarlatina, as well as of measles and small-pox, on all occasions and in all instances. We know that the vitality of several kinds of seed may be preserved for many ages; and why should not the poisonous properties of an animal fluid or miasm be preserved for months, or even for years, when exclusion from the air and other circumstances favour the preservation? Admitting this, allowing also that the seminum often requires many days to take root and to develop itself into full efflorescence, knowing, moreover, the diversified media by which the morbid or poisonous emanation may be preserved, conveyed, and brought even into unrecognisable operation, it cannot be a matter of surprise that the source of infection frequently admits not of demonstration. Two powerful circumstances in favour of the existence and operation of a specific infection or poison have too frequently been kept out of view, namely, 1st. The non-existence or non-appearance at any time of this disease in several secluded or isolated localities and islands, although the sev-

eral causes tending to favour the dissemination and malignancy of the disease—those very causes which have been believed by some to be capable of originating the malady *de novo*—have been there present in the most pregnant forms of union and association; and, 2d. The fact that, when the disease has made its appearance in such places, it has always been traced to the introduction of infection, and, having exhausted itself on all the predisposed to it, has entirely ceased and disappeared for years, until again introduced by the infected or by fomites.

78. If we refer to what is known (and our knowledge in this and in other allied topics is very imperfect) respecting the statistics of disease in most of our cities and large towns, we shall find that at no time are cases of scarlatina altogether absent. I believe, moreover, that cases often occur which are either not recognised at all, or not as cases of this disease. Hence sources of infection are rarely absent from these localities, irrespective of the chances of transport to and transmission from them; or, if absent for some time in one place, they are present in other places, from which they are transmitted to those which have been for a longer or shorter time exempt from them, and which, from this circumstance, furnish subjects predisposed to infection.

79. *B.* The *media* by which this disease is transmitted from those affected to the healthy are generally the atmosphere surrounding the sick, and substances which imbibe the miasms emanating from those who are or have been recently attacked, and which retain it for a time, but soon impart it to the air—*fomites* (see *art. INFECTION*, § 16, 17). It has not been demonstrated, nor, indeed, does the matter readily admit of precise demonstration, how far the miasm of scarlatina may extend by means of the atmosphere from a person sick of the disease. Much will depend upon the state of the air as to humidity, motion, &c., and upon the predisposition of those exposed to it. It has been supposed, that the appropriation of a room in schools for such children as may be seized with either scarlatina or measles may prevent the spread of the disease among the healthy. This has been attempted in many instances; and by myself, in respect of these diseases, on several occasions, and on two occasions with complete success, in others with partial but very considerable success. Much depends upon the size and construction of the building, and the strictness of the seclusion, and of the precautions as to fomites. This measure failed in Heriot's Hospital, Ackworth School, and the London Foundling Hospital, where the buildings furnished excellent means of isolating the infected. But I suspect that the precautions taken failed in preventing the transmission of the infecting miasm by persons or clothes. Besides, when a school is large, some of its inmates may have been so long the subjects of the eruptive fever before the disease is recognised as to have infected others previously to their removal. When the building furnishes the means of complete isolation, the attempt at thus preventing the spread of the disease should be made; for it is better that the infected should receive due attention in such circumstances at the place of infection than that they should be returned to their friends, where they may trans-

mit the disease to many others; and it is even better that those in the infected school, who have not yet sickened, should not be allowed to leave it, inasmuch as they may convey the disease in their persons or clothes to the families to which they would return.

80. *C. Fomites*, or substances impregnated with the miasm exhaled by persons sick of scarlatina, are frequent media by which this disease may be transmitted to the healthy, either in the vicinity of the sick or in places at a great distance. The *duration* of the period in which the capability of infection is possessed by fomites is uncertain, and it has not been ascertained. It may be inferred to be very short when the impregnated substances have been exposed to a free current of air, and much longer when they have been shut up and entirely prevented from imparting or losing the retained miasm. Feather-beds and woollen bed-clothes retain the infection for the longest period, especially when undisturbed or shut closely up. The duration of the power of infection, in respect of these articles and of woollen body-clothes, has not been and is not likely to be determined; for various circumstances will either shorten or prolong the period. Dr. SIMS remarks, that "the infection seemed to remain in a house some, but not many, weeks after all the family were recovered." In large, airy houses, where ventilation and means of purification are adopted, a very few weeks may be considered sufficient to remove the infectious property, especially if the beds and bedding are subjected to a high range of temperature, as advised in the article on the *prevention of PESTILENCE* (§ 77). But where these means are neglected, and in close, dirty, and low apartments and houses, and in crowded localities and houses where the beds, bed-clothes, hangings, &c., are foul and insufficiently aired, the power of retaining and transmitting infection may exist for several, if not for many weeks. When fomites are shut up and excluded from imparting the retained miasm, the disease may be thereby conveyed to distant or remote parts, and even without the source of infection or the media of transmission either being recognised or admitting of recognition.

81. *D.* The propagation of the disease by *inoculation*, and by the contact of the morbid secretions of the disease, has been demonstrated. Sir B. HARWOOD and others have tried to inoculate healthy children with the fluid from vesicles sometimes intermingled with the eruption of scarlatina in hopes of producing a milder disease, as in small-pox; but although the disease was thus communicated in many instances, no mitigation of its type was thereby obtained. In a case which came under my care, the disease was produced by the contact of a small portion of the discharge from the throat of a person with malignant anginous scarlatina, and the patient thus infected had the disease in the most severe form, and recovered with difficulty.

82. *E.* The *susceptibility* to the infection or contagion of scarlatina is exhausted or annihilated after the disease has run its course, after the scarlatinal poison has produced its specific effects. This law obtains as remarkably in respect of scarlatina as of small-pox. The impossibility of being infected by this malady a second time has been fully ascertained by Dr.

WILLAN and many others; but a very few exceptions to the law have been recorded, so few as not to amount to more than one instance among two or three thousands constituting the law. This immunity from a second attack may be viewed as a proof that the disease is not merely one of the blood alone, but is also, if not chiefly, one primarily affecting and changing the susceptibility of the organic nervous system, the blood being altered by the state of this system, on the conditions of which this fluid is so intimately dependent.

83. *F. The coexistence of scarlatina with measles, with the vaccine disease, with erysipelas, and with small-pox has been contended for by some and denied by others. I believe in its coexistence with measles, and in the production in consequence of the hybrid disease described under RUBEOLEA; and its coexistence with the other eruptive maladies just mentioned, especially vaccinia, is not unlikely to occur under circumstances favouring the operation of their respective poisons upon the frame at the same time.* Dr. GREGORY states that he has seen at the Small-pox Hospital "several unequivocal cases of the simultaneous existence of small-pox and scarlatina anginosa." And Mr. MARSON, surgeon to that hospital, remarks, that, in the course of eleven years, "he has seen seven persons who had variola and scarlatina simultaneously."—(*Med. Chir. Transact.*, vol. xxx., p. 121.)

84. ii. PREDISPOSING CAUSES OR CIRCUMSTANCES.—*The causes predisposing to the infection of scarlet fever are numerous, and may be referred to the states of individuals exposed to infection, and to the circumstances or conditions favouring the concentration and the invasion or operation of the poisonous miasm.*—A. As the mode in which this disease is generally infected, whether the infectious emanation proceeds directly from the sick or mediately, or by means of fomites, is by the inspiration of air contaminated more or less with the poisonous miasm, which affects, nearly at the same time or in quick succession, the organic nerves of the respiratory surfaces, and the blood distributed to these surfaces—morbidly impressing the former, and passing by endosmosis through the latter—it follows that the susceptibility to infection must depend much upon the states of the organic nervous power and of the vascular system, and that, when the energy of the one is impaired, and the action of the other is lowered, the frame will be more liable to be invaded by the poisonous influence. Hence some individuals are more prone to infection than others, and hence the same person is more predisposed at one time than at another, according to the varying states of nervous tone and vascular action. The conditions of the atmosphere, as powerfully modifying these states, have considerable influence in predisposing to infection; but to this and to the immediately preceding topic, I can add nothing to what I have stated in the article on INFECTION (see § 44–55).

85. *B. There is no cause of predisposition more generally manifested than the age of childhood.* The susceptibility of infection appears to be greatest from the period of weaning to fully adult age. After thirty or forty years of age the susceptibility is remarkably diminished; but although I have seen several cases from thirty-

five to fifty years of age, I have met with one only between fifty and sixty, and he died in twenty-four hours, owing to the extension of the disease to the larynx. As the susceptibility of infection is greatest in childhood, and as the proportion of those who have had the disease at this epoch is very great, it follows that the number of non-infected at adult and advanced age is comparatively small. Although cases of the disease at these ages are thus few, yet they are generally of a most severe character, especially about and after forty years of age, as respects not merely the complications, but also the type of the eruptive fever from its commencement, and the danger is thus increased with advanced years. According to my experience, the younger the child the milder is the attack; but there are numerous exceptions to this law, arising out of the aggravating circumstances connected with weaning and dentition, and the numerous *concurring predisposing causes* observed among the poor, of which the most influential are, ill clothing; insufficient and unwholesome food; low, ill ventilated, and malarious abodes; exhalations from cess-pools, privies, and sewers, and inattention to cleanliness, with various others tending to lower the constitutional powers and the vital resistance to the invasion of infection, to concentrate the infectious emanation, and thereby to increase the dose of the poison.

86. Infants during the period of suckling very frequently escape the disease, although every other member of the family may be attacked. I have seen, on several occasions, every one of a family of eight or nine children affected in a very short period of each other, and the infant at the breast to escape. The cause of this *comparative immunity* is not very apparent. Probably infants at this period are less exposed to the infectious emanation; but this depends much upon the circumstances of families; among the poor the exposure is not materially less. It is rather to be imputed to a less susceptibility of infection at this period, depending, probably, upon the circumstances of the infant being then nourished by a secretion directly from the secreting organs of the mother, and thus possessing some measure of an invigorating vital emanation, thereby enabling the infant to resist the infection. I have observed, in many instances, that persons who have experienced a very severe attack of measles have escaped the infection of scarlatina, although much exposed to it. This circumstance is deserving of farther observation; but, from whatever cause, some persons resist this infection, although frequently exposed to it from an early age. Out of 2614 cases recorded by Mr. FARR in his fourth report, 2419 were children, 182 adults, and 13 aged persons. Scarlatina may attack the *fetus in utero*. Instances of this have been furnished by several writers. Dr. GREGORY states, that "on the 28th of April, 1839, his youngest child was born, evidently suffering from fever. The throat was affected the following day, obviously from angina maligna. Eruption was never developed. The infant drooped and died on the first of May." (P. 146.)

87. *C. Scarlet fever affects both sexes in equal proportions, and very remarkably so.* In London it destroyed, in 1833, 747 males and 777

females; in 1839, 1241 males and 1258 females; and throughout England and Wales, in 1840 (exclusive of the metropolis),* 8927 males

* The following will show the comparative prevalence in the metropolis of scarlet fever, measles, and small-pox, from 1838 to 1848, both years included, during the last eleven years. It must be manifest that the numbers assigned can be an approximation only to the true amount, as the causes of death are in many instances arbitrarily assigned in the returns, but they are sufficiently accurate to convey useful information:

Years.	Scarlet Fever.	Measles.	Small-pox.
1838	1524	588	3817
1839	2499	2036	634
1840	1954	1132	1235
1841	663	973	1053
1842	1224	1293	360
1843	1867	1442	438
1844	3029	1182	1804
1845	1085	2318	909
1846	938	747	257
1847	1433	1778	955
1848	4736	1143	1617
During 11 years, 20,962	14,632	13,079	

During the last eleven years the deaths in the metropolis from scarlet fever have been greater than from measles, or from small-pox, or from hooping-cough, or from continued fever. In only three of these years have the deaths by measles been greater than those by scarlatina, and in only two has the mortality from small-pox exceeded that of scarlet fever. In 1841 and 1846, the mortality of scarlatina and measles was low, and in the latter year that of small-pox was the lowest. In 1839, 1843, 1844, the mortality of both scarlet fever and measles was high. During 1848, the deaths from scarlatina were about three times greater than the average of the former years. The maximum mortality from measles occurred in 1845, and from small-pox in 1838.

The greatest number of deaths from scarlet fever occur among the poor, owing to the circumstances which both predispose to infection and render the disease more malignant; and even those causes which develop the sequelae of the disease and render them fatal (see § 42), are also most prevalent in the lower classes. If the above amount do not comprise the deaths from dropsy, or other diseases consequent upon scarlatina, the mortality from this malady must have been greater than here stated. The above results will show that there are few diseases—perhaps none—from which the general amount of mortality and of danger is greater than in scarlet fever, and yet there is not one of which the pathology and treatment has received less attention and elucidation in modern times than it.

The proportion of malignant to mild cases of scarlatina cannot be truly estimated, as it differs in different seasons, in different localities, and in different epidemic prevalences. Dr. WILLAN found it to be one of the former to four of the latter; and Dr. CLARK one to two; and one of six had dropsy during convalescence. The rate of mortality must necessarily also differ with the above causes—the fluctuation sometimes observed being remarkable—being from one in forty to one in six cases. Dr. GREGORY considers that the average mortality is about six per cent.; and that, while throughout England and Wales 19,816 deaths occurred in 1840 (a year of average mortality for London), the total number of seizures must have amounted, according to this calculation, to about 330,266 in that year for the whole of England.

[This disease, as our author correctly states, first appeared in this country, in an inland town of New Hampshire, Kingston, in May, 1735. The first child attacked died in three days. In one week afterward three children in another family, four miles distant, were successively seized, and all died. In August following it appeared at Exeter, six miles distant; and in September it broke out in Boston, fifty miles distant, though it did not appear at Chester, six miles west of Kingston, till October. It spread very gradually west and south, and was two years in reaching the Hudson River, two hundred miles west. NOAH WEBSTER states that "it attacked the young in the most sequestered situations, and without a possible communication with the sick, although the disease was very infectious." He also remarks, that "for many years after it was epidemic, it frequently broke out in different places without any apparent cause, but did not spread—a striking proof that such diseases will not become epidemic by the sole power of infection, but that some general cause must aid its propagation, or it will perish in its cradle. This is probably true of every species of pestilential disease" (on PESTILENCE, vol. i., p. 251). WEBSTER'S philosophy of epidemics is, indeed, very

and 8935 females. This disease appears to be most prevalent in temperate climates. It is stated to be comparatively rare in Bengal. Dr.

comprehensive. "When observation and philosophy," he remarks, "shall prevail over the prejudices of men, in regard to the origin of these diseases from infection, it will be found that the *angina*, in its various forms, is only a particular stage or modification of the pestilence which spreads over the world at certain unequal periods. The milder forms of the pestilence appear in catarrh, measles, and chin-cough, which usually appear together, or nearly so, at the beginning of the more violent general contagion; the later and more fatal stages are marked by anginas, cynancha maligna, petechial fever, bilious and glandular plague in summer, and pestilential pleurisies in winter. There are certain times when the constitutions of men in all parts of the world contract a poison, which nature makes an effort to expel; and the different epidemics that accompany or follow each other in rapid succession, appear to be the different modes by which nature strives to rid the human body of the virus. These modes depend on the season of the year, the constitution or age of the patient, and a multitude of subordinate circumstances. Whether this poison is a positive substance inhaled by the lungs and pores, or is the effect of mere debility, which unfits the urinal parts of the body to perform their functions, is a question of a curious nature."—(Loc. cit., p. 215.)

The scarlet fever prevailed extensively in Boston in 1735-6; about 4000 persons were attacked with it, of whom 1 in 35 died. It spread very generally over New England at this period, carrying off whole families. In Kingston, where the usual annual mortality was not above 9 or 10, it rose in 1735 to 102, and an equal degree of mortality was not unusual in other places. It was computed that 500 children in Maine died of this disease in 1735, out of a population of 9000 whites. We read that the prominent symptoms were "swollen throat, with ash coloured specks, efflorescence on the skin, distress in the head, great debility, and strong tendency to putrefaction." In Kittery 122 children died of it. In 1736 it was not so general or mortal. In 1737 it broke out afresh: 75 died in North Yarmouth, 49 in Falmouth, and in some places not one attacked survived. Mr. SHATTUCK remarks (on *Vital Statistics of Boston*, in 27th volume of *Amer. Journ. Med. Sci.*, p. 373), that "it is somewhat singular that, after the lapse of just about a century, scarlet fever should have prevailed again as one of the most fatal diseases of New England."

The following table shows the comparative prevalence in Boston of scarlet fever, measles, and small-pox, from 1811 to 1839, inclusive:

Years.	Scarlet Fever.	Measles.	Small-pox.
1811	1	0	2
1812	0	0	0
1813	0	1	0
1814	1	0	0
1815	21	0	4
1816	3	6	0
1817	1	0	0
1818	0	0	0
1819	12	0	0
1820	10	0	0
1821	4	149	4
1822	1	3	0
1823	1	0	0
1824	0	2	1
1825	4	77	1
1826	16	10	0
1827	8	0	3
1828	3	0	2
1829	4	78	0
1830	5	13	1
1831	84	2	4
1832	200	70	2
1833	90	2	0
1834	39	1	4
1835	73	188	7
1836	31	31	6
1837	50	23	13
1838	106	20	3
1839	222	3	60
Total.. 924	368	105	

The deaths in Boston from the eruptive fevers, from 1811 to 1820, were 64, being 7.5 per 1000 of all diseases; from 1820 to 1830, there were 402 deaths from the same class of diseases, or 35.1 ratio per 1000; and from 1830 to 1839, there were 1402 deaths from eruptive fevers, being a proportion of 96.2 per 1000 of deaths from all diseases. During the same periods the total deaths from epidemic and endemic disease were, for the first period, 1193; for

GREGORY remarks, that Dr. JACKSON, formerly

the second, 2037; for the third, 3622, being a ratio of 140.8, 177.7, and 248.6 per 1000 of all the deaths. The same increase of mortality from the eruptive fevers has been observed in every part of this country.

The following table shows the comparative prevalence of scarlet fever, measles, and small-pox in the city of New York, from 1819 to 1849, inclusive:

Years.	Scarlet Fever.	Measles.	Small-pox.
1819	5	10	0
1820	5	74	0
1821	3	109	0
1822	1	1	0
1823	2	117	18
1824	3	100	394
1825	10	53	40
1826	24	31	58
1827	4	172	149
1828	11	28	93
1829	188	91	16
1830	246	22	176
1831	258	39	224
1832	224	290	89
1833	179	38	25
1834	408	212	233
1835	174	82	351
1836	202	443	173
1837	579	238	164
1838	257	79	91
1839	158	133	68
1840	391	186	232
1841	366	113	209
1842	416	60	181
1843	223	118	117
1844	225	51	29
1845	63	136	425
1846	114	71	141
1847	93	275	53
1848	93	77	544
1849	266	125	326
Total..	5240	3500	4619

For the following tables and remarks relative to the comparative prevalence of scarlatina, measles, and small-pox in Boston and Massachusetts, we are indebted to LEMUEL SHATTUCK, Esq., one of the ablest writers on medical statistics in our country.

"STATEMENT showing the total number of deaths from all causes in Boston, in different periods, and the number and proportion per cent. from scarlatina, measles, and small-pox during the same period.

Causes of Death.	Ten years. 1811-20.	Ten years. 1821-30.	Ten years. 1831-40.	Nine years. 1841-49.
All causes	8,470	11,470	16,414	27,127
Specified causes	7,522	9,554	15,077	26,796
<i>Special Causes.</i>				
Scarlatina	30	48	972	1,468
Measles	28	332	341	587
Small-pox	6	8	214	342
<i>Per Centage.</i>				
Scarlatina	.40	.50	6.46	5.43
Measles	.37	3.48	2.26	2.18
Small-pox	.08	.08	1.42	1.28

It appears from this statement that thirty deaths only occurred from scarlatina in the ten years, 1811-20, being four tenths of one per cent. of the known causes of death, while in the nine years, 1841-49, there occurred 1468, or 5.43 per cent., from the same cause! Other zymotic diseases, especially fevers and those affecting the digestive organs, increase during the same period, and lessen the apparent increase which would otherwise appear in some of the above-named diseases.

The following table exhibits the same facts relating to the deaths, returned under the registry laws, from all the counties in the state except Suffolk (Boston), for the years specified.

Causes of Death.	1842.	1843.	1844.	1845.	1846.	1847.	1848.
All causes	7,496	8,305	8,250	8,715	9,211	10,816	11,346
Specified causes	6,149	7,177	7,076	8,070	8,741	10,317	9,954
<i>Special Causes.</i>							
Scarlatina	396	561	328	538	516	418	176
Measles	86	30	32	44	46	136	43
Small-pox	13	12	11	5	32	12	21
<i>Per Centage.</i>							
Scarlatina	6.44	7.81	4.63	6.67	5.90	4.05	1.77
Measles	1.40	.42	.45	.54	.53	1.32	.43
Small-pox	.21	.17	.16	.06	.37	.12	.21

of Calcutta, could not recall to mind any cases which he had seen in India deserving the name of scarlatina. I never met with a case within the tropics. I believe that the disease has not yet been imported into Australia, Van Diemen's Land, and New Zealand. It was brought to North America in 1735, and its progress was very slow, but very fatal. The epidemic in 1736 in that continent was most pestilential. "Villages were depopulated by it, and parents had to bewail the loss of all their children."

88. *D.* As to the complete immunity consequent upon an attack of this malady, it may be remarked, that this is to be imputed to the exhaustion of susceptibility produced by this poison, as by several other animal poisons, as respects their several specific effects. That the poisonous emanation or material should fail of producing any effect upon a person who has, at

STATEMENT showing the influences of the age and season of the year on scarlatina.

Age.	Four years. 1845-48.		Seven years. 1842-48.		Month.	Four years. 1845-48.		Seven years. 1842-48.	
	M.	F.	Both sexes.			M.	F.	Both sexes.	
Und. 1	140	113	412	Jan.	79	85	280		
1 to 2	133	142	456	Feb.	72	76	281		
2 to 5	288	309	1178	Mar.	95	93	328		
5 to 10	172	152	645	April	58	86	266		
10 to 20	37	68	210	May	68	66	269		
20 to 30	7	35	70	June	57	69	268		
30 to 40	7	4	19	July	73	52	244		
40 to 50	3	2	13	Aug.	89	67	273		
50 to 60	3	3	9	Sept.	65	58	241		
60 to 70	1	7	14	Oct.	58	70	233		
70 to 80	1	—	6	Nov.	41	63	212		
80 to 90	1	—	4	Dec.	44	64	204		
Not stated	5	14	157	Not stated			94		
Total	799	849	3193	Total	799	849	3193		

The above table contains the returns of all the counties in the state excepting Suffolk. In four years the sexes as distinguished; for the whole seven years they are added together."—(Letter to the Editor, April, 1850.)

On examining the medical statistics of Philadelphia, as furnished by Dr. EMERSON (in the first volume of the *Am. Jour. Med. Sciences*), the same increased prevalence of the eruptive fevers is observed in that city. Beginning, for example, with the year 1807, there were not over three deaths annually reported by it until 1820, when there were thirty deaths by it; from this it gradually declined to 1826, when it amounted to only four; since which it has again increased in a still higher ratio. From 1807 to 1827 there were reported 1080 deaths from small-pox, 667 from measles, and 102 only from scarlet fever; the greatest mortality from the latter disease, as well as small-pox, being between the second and fifth year, while that from measles was between the first and second year.

In my paper on the "Medical Statistics of New York" (in the nineteenth volume of *Am. Jour. Med. Sciences*, p. 25-52), I have observed, "It is a singular fact, that while there has been a gradual and constant diminution of deaths from other fevers, especially typhus and bilious remittent, which were formerly quite fatal, there has been for several years a constant increase from scarlet fever, amounting, within the last six years (Nov., 1836) to 1500. The largest number of deaths from this disease for any one year was in 1834, when there were 418. In the year 1829, 188 fell victims to it within a few weeks. Until that year, from its commencement in 1817, the average mortality from it was only seven or eight per cent. Since that time its ravages have been truly distressing; whole families of children having been swept off by it in a few days. In 1834, the deaths from all other fevers, scarlet excepted, were 252, while those from the latter were 418; in 1833, 192 from the former, and 179 from the latter; in 1832, the year of the cholera, 237 from the former, and 221 from the latter. In the six years from 1828 to 1833, in which were reported 1103 deaths from scarlet fever, an estimate for all the months gives the following result, commencing with the lowest:

"In the month of June, from scarlet fever, 53 deaths; May, 62; April, 66; August, 70; September, 71; March, 74; October, 98; February, 100; January, 117; November, 124; December, 191; thus showing that its fatality is greatest during the coldest months."

some more or less remote period, been affected by it, is a most important law in this and other exanthematous and pestilential maladies, especially as respects the safety of the species. The protection thus obtained is the chief means of preventing the depopulation of districts where any of these maladies break out; and, accordingly, it has been observed, that where scarlet fever, or measles, or small-pox has been introduced for the first time, or after the lapse of very many years, the whole, or a large proportion of the population being susceptible of infection, the destruction of human life has been there most terrific. That the immunity obtained by an attack of those diseases which infect the constitution only once, cannot be imputed to any change in the blood consequent upon such an infection, may be inferred, 1st, from the impossibility of a permanent change in this fluid that could prevent the recurrence of any alteration in it which had taken place on some former occasion; and, 2d, from the gradual and entire renewal of this fluid after longer or shorter periods, a renewal of susceptibility inevitably supervening if this property resided in the blood. We must, therefore, refer the immunity from a second infection to the organic nervous system, and view the susceptibility of this system to have been so affected or specifically changed by the first operation of the poison as no longer to be capable of being roused by any subsequent application of the same species of poison as previously affected it to a similar series of morbid changes and actions.*

89. *E. The Period of Latency or Incubation—the precursory or formative Period.*—The time which elapses between exposure to infection and the commencement of the febrile action may be expected to vary much, as it actually does vary, according to the susceptibility of the individual, either from constitution, or from the influence of predisposing causes, or from the concentration or dose of the poison. I have stated much of what is known as to this matter in the article on INFECTION (§ 32). All that can be advanced is, that the period is very uncertain. It may be only a few hours, or it may extend to ten or twelve days. Dr. MARON has recorded some cases in which he considered this period to have been prolonged to twenty-four or twenty-five days. The most common period is most probably three or four days, it being rarely shorter than two days, or longer than eight. In a case referred to by M. ROS-TAN, in which the disease was induced by inoculation, seven days elapsed before the appearance of eruption.

90. *X. PATHOLOGICAL INFERENCES.*—It may be useful to conclude this view of the *pathology* of scarlet fever with certain inferences as to those topics connected with the nature of the malady that have an important relation to the treatment of it, and that should furnish the ba-

sis of our intentions of cure.—*a.* The *cause* of scarlet fever appears to be an animal miasm or poison of a specific kind—a specific animal seminum reproducing itself to an indefinite extent.—*b.* It is not proved that this *seminum*, or specific form of fever, is generated or appears *de novo*, from the combination of circumstances or states shown above to favour the extension of the malady; but, on the contrary, it is much more probable that the disease occurs only from the operation of this seminum or specific infectious agent proceeding either directly from a person labouring under the malady, or mediately by fomites which retain, convey, and communicate the seminum.—*c.* The *origin* or *source* of this seminum is not known; but very probably, like small-pox, the disease was first generated by the lower animals, or occurred among them as a pestilence or epizooty, and not unlikely among the equine race, and was thence communicated to man—the seminum formed among these animals having affected the human species in circumstances favouring the extension of it from the former to the latter, among whom it has been preserved ever since.*—*d.* The spread of the disease is favoured by certain *conditions of the air*, but what these conditions are is chiefly a matter of inference: a humid, close, and malarious atmosphere appears to favour the extension and operation of the poison; and all the other conditions shown in the article INFECTION to favour or to restrain the extension of infectious agents exert similar influences in respect of this. Extremes of temperature seem to diminish the spread of the malady, and to render attacks of it more mild.—*e.* The states of those exposed to the morbid poison proceeding from the affected appear either to favour or to resist the action of this poison, and, when favouring it, very remarkably to modify its operation and effects (§ 84, *et seq.*), conformably with predisposition, susceptibility, diathesis, temperament, and existing constitutional or visceral conditions, the susceptibility of a second infection by the seminum of the malady being annihilated by an attack.—*f.* The poisonous material infects the frame of the healthy in the *manner* fully explained in the article on INFECTION (§ 44, *et seq.*), and develops its *effects* in the course of a period varying in duration from two to twelve days, or even in a shorter, but very rarely in a longer time, according to the susceptibility and predisposition of the recipient, and the concentration or dose of the poison (§ 76).—*g.* The effects of the poison, like those of all morbid poisons, are exerted *primarily* upon the organic nervous system, and consecutively upon the

* [We apprehend that the same objections may apply to this theory as to that which imputes the immunity of a second attack to changes in the blood; for if this fluid is "gradually and entirely renewed" from time to time, so also are the solid textures of the body, though not with equal rapidity and frequency. Moreover, we can almost as readily conceive of permanent changes in the one as in the other; the fact is, that the cause of this exemption from second attacks of disease is one of those mysteries which will probably always elude our grasp, being one of those ultimate facts of science the causes of which cannot be detected.]

* [If the disease was first generated by the lower animals, the question naturally occurs, why, under similar circumstances, may the virus not be generated *de novo*, and reproduced as often as the conditions for its manufacture exist? While we admit that the disease is always propagated by an animal poison or virus of a specific kind, we see no reason for believing it to originate among the lower animals, nor for supposing that it has never been generated except on one occasion, and that unknown; on the contrary, we hold that, like syphilis, itch, and other acknowledged contagious diseases, it may be produced *de novo* whenever favouring circumstances are present. We have seen that the scarlet fever was first observed in this country in an interior town of New Hampshire, in 1735, from whence it gradually spread over the country. There is no proof of its importation, but, on the contrary, very urgent and satisfactory reasons could be urged against such a supposition.]

vascular system and the blood; and as respects this malady especially, *secondarily* upon the *kidneys*, the *throat* and *skin*, either of these parts, or any two of them, or even all of them, evincing these effects in a more or less manifest manner, these latter or local effects constituting the specific characters of the disease.

—*h.* The early affection of the *kidneys* in this disease, especially when the affection is such as to impede or to interrupt, or to altogether arrest the *urinary excretion*, produces a change in the blood, in addition to that already occasioned by the infectious agent acting either directly upon this fluid or through the medium of the organic nervous system, the change in the blood thus produced often occasioning asthenic or diffusive inflammation of serous surfaces, or of predisposed organs, with serous, or sero-albuminous, or sero-fibrinous infiltration or effusion of a watery lymph—causing the several *primary complications* described above (§ 27, *et seq.*), and already more fully explained (§ 41, *et seq.*).—*i.* After this malady has run its usual course, it is more liable than any other exanthematous fever to be followed during desquamation and recovery—during a period varying from seven or eight days after the fading of the eruption, to four, or even six weeks at the utmost—by a consecutive affection of the *kidneys*, indicated by scanty, albuminous, or even bloody urine, and by the presence of epithelial cells in this fluid, sometimes moulded in the fibrin or lymph into the form of the urinary tubes, and consecutively by *edema*, *anasarca*, or *inflammation of internal parts*, or by *effusion into serous cavities*.—*k.* These *sequela* or *secondary complications* result from the consecutive affection of the *kidneys* (§ 42, *et seq.*), which appears to consist chiefly of an obstruction caused by the accumulation of exfoliated epithelium in the tubuli and of a deposition of albuminous lymph in the structure of the organ, this latter obstructing the circulation in the capillaries by its pressure, while the accumulated organic detritus in the tubuli obstructs the passage of the secretion along these canals, and impedes or interrupts the function of the organ.—*l.* The consequences of the affection of the *kidneys* at an early stage of the disease, and of the consecutive obstruction of these emunctories at a much later period, are, as shown above (§ 41, *et seq.*), morbid or contaminated states of the blood—a state of *excrementitious plethora*, consisting of an excess of watery elements, and of effete, deleterious, and irritating materials and saline ingredients. The accumulation of these *excrementitious matters* in the circulation, as well as of *those usually eliminated by the skin*, occasions the several complications—whether inflammatory or dropsical—observed in the course of the malady, or subsequently as *sequela* or *reliquiae*.—*m.* Not the least important of these latter is the *anæmia* observed not infrequently to follow the renal and dropsical affections during or consequent upon scarlet fever.—*n.* The occurrence of the usual *sequela* of scarlatina is favoured by several physical causes, to which the patient is liable to be exposed during the process of desquamation and recovery; and it is often prevented by measures calculated to restore the functions of the skin, and to prevent vascular determination to, or congestion of the *kidneys*, and to diminish these, with the

other consecutive or associated causes of obstruction of these organs.*

* [M. BILLARD treats of this disease under the usual forms of *simplex*, *anginosa*, and *maligna*, and states that it is always accompanied with violent fever, very often with angina or ophthalmia, and sometimes with pneumonia, gastro-enteritis, or encephalitis; while of all complications, that of the *throat* he regards as the most frequent and serious. He states that inflammation of the larynx or tonsils exists in a greater or less degree in almost every case of scarlatina, either at the commencement or in the course of the disease, while the other complications are only observed in such as are exposed by a particular predisposition to inflammations of the encephalon or of the alimentary canal.

The table which I have given from Mr. SHATTUCK (p. 750) shows also the truth of BILLARD's statement, that scarlet fever prevails more particularly during second infancy and in youth than during the period of suckling, and when it does attack in the first infancy it does not affect children in the same manner as those of a more advanced age. See STEWART'S BILLARD, ed. 1850, p. 104, and Appendix, p. 556. From this I quote the following remarks, furnished by request for that work:

"I regard the local inflammation which attends scarlatina as a specific affection, identical with the diphtheritis of BRETONEAU and other French writers, and characterized chiefly by a membranous exudation on the surface of the mucous membrane of the mouth and fauces. We see this tendency, also, after the application of a blister, and, indeed, wherever the cuticle has been removed by any cause whatever. We sometimes, though rarely, find it extending down the trachea and bronchiae, giving rise to all the symptoms that attend an attack of croup.

"It is, however, important, when speaking of scarlatina, to keep in mind the two very different forms which it assumes; namely, the *anginose*, or purely inflammatory, and the *malignant*, or *congestive* form, in which we have a frequent, feeble pulse, cold extremities, extreme prostration, and great determination of blood to the head. In the latter, patients often die after a short illness, sometimes before reaction is established, and in such cases the scalpel reveals nothing. The citadel of life has been invaded by an invisible foe, and its forces have succumbed, leaving behind no vestiges of the attack.

"In treating of the pathology of scarlet fever, my remarks will naturally fall under two divisions, namely, 1. Lesions of the Solids; and, 2. Lesions of the Fluids.

"1. *Lesions of the Solids.*—In scarlatina there is hyperæmia of the mucous membranes generally, and of the mouth and fauces in particular, which constantly tends to terminate, either by a membranous deposit of coagulable lymph or by ulceration; and the ulcerative process, when once established in any part, is very apt to extend its ravages to the neighbouring parts of analogous structure. This inflammation, we have reason to believe, is of a specific character, depending probably on the peculiar impression made on the nervous system by the epidemic influence. At a very early period in the disease, indeed, before any constitutional symptoms appear, we shall perceive, on examining the fauces, that the vessels of the mucous membrane are highly injected, and upon the surface of the tonsils and soft palate gray patches of lymph, often mistaken for ulcers, which increase in extent as the disease progresses. Preceding, or accompanying this appearance, we sometimes see small vesicles of a purple or whitish colour, and these are sometimes found also upon the skin. In severe cases the fauces assume a deep modena red or purple suffusion, and when this is the case ulceration is sure to follow. Flocculi of lymph appear scattered over the surface in irregular patches, resembling in appearance the purulent secretion of an ulcer, from which they can at first scarcely be distinguished. In a short time, however, unless removed by gargling or some other means, these patches assume a dark or black colour, attended with a peculiarly oppressive fetor. On removing them the surface beneath appears red, spongy, and somewhat swollen. The tonsils are more or less enlarged from the commencement, and in severe cases are almost uniformly the seat of extensive ulceration.

"*Autopsic examination* by no means reveals the same appearances. In many cases where I expected to find extensive local ravages, there were scarcely any marks of disease present; and in others, where the constitutional symptoms were comparatively light, I have found the most frightful vestiges of disease. You will doubtless recollect the case of the child in Amos Street, whose dissection you witnessed a short time since. In this case the disease assumed a very mild form, yielding kindly to medicine. In a few days the patient was apparently well, with the exception of a slight cough, and the physician in

91. XI.—TREATMENT.—*The treatment of scarlet fever has hitherto been unsatisfactory, and*

attendance ceased his visits. In about a fortnight afterward he was again called in, and found her labouring under an incessant cough of a croupy character, though at this time she was playing about the house. In two or three days afterward she died from suffocation during a coughing fit. On examination, I found a great portion of the larynx destroyed by ulceration, and the fauces were completely honey-combed. Numerous perforations existed in the tonsils, palate, &c., of various sizes, while the mucous lining of the trachea was either softened or abraded through its whole extent. There was a vast collection of frothy, muco-purulent matter collected in the larynx and trachea, which doubtless was the cause of the suffocation. The other organs were healthy.

"In another case, which happened not long after, you also was present at the examination, and can bear testimony to the great difference in the appearances, on dissection, from those above given. The patient was a boy five years of age: at an early period there was considerable redness about the fauces, and the tonsils were somewhat swollen. The breath was hot and offensive, and the pulse ranged from 120 to 140. There was extreme restlessness and jactitation throughout the whole course of the disease, with frequent moaning and screaming, a wild expression of the eyes, irregular and often laboured respiration, temperature of the body very unequal, head generally hot, and extremities cold. As the disease progressed, his mouth and lips became encrusted with a dark brown sordes; the tongue was swollen, fiery red, and cracked; the throat became filled with a thick, glutinous, tenacious mucus; the stomach was extremely irritable, and the epigastrium tender on pressure. There was more or less delirium throughout the whole sickness. He sunk into a stupor, and died on the sixth day from the attack.

"*Autopsy eight hours after Death.*—Body emaciated; a few black spots on the posterior part of the body; a yellowish mucus discharging from the mouth and nose in considerable quantity. The lungs were found healthy, and remarkably free from blood; no marks of inflammation about them; and, on cutting into them, we found but very slight effusion into the air-cells. The mucous surface of the trachea and bronchia was covered with a white mucus, which, on being removed, the membrane presented a healthy appearance. The liver was healthy; the gall-bladder full of bile; the heart natural; and the pericardium contained the usual quantity of serum. There was no ulceration about the fauces, tonsils, or palate, and the whole lining membrane of the mouth was perfectly healthy. It is proper, perhaps, to remark, that this patient had been very freely bled and leeches.

"We, however, generally find in this disease ulceration about the glottis and tonsils of greater or less extent, though the hyperæmiæ of the mucous membrane, so constant during life, is very apt to disappear after death. The same is also true of the vascularity of the mucous coat of the stomach and small intestines. The air-passages very often present pathological alterations. We sometimes see merely a vascularity of the lining membrane, at other times a thickening, and occasionally ulceration. It is not uncommon to find the trachea and bronchæ filled with a thick, tenacious matter, of a muco-purulent character. In a few cases I have discovered marks of inflammation about the lungs and pleura; but this is by no means of frequent occurrence, and, when present, are to be viewed as an accidental complication. Where leeching and venesection have not been practiced, the lungs will frequently be seen gorged with blood. In those cases attended with an acrid, sanious discharge from the nostrils, and where there is a tendency to the formation of a glutinous, brown sordes on the mouth and teeth, I have invariably found more or less extensive marks of disease about the brain; and the former symptom, particularly, I have been led to consider as a highly dangerous one, from its indicating with great certainty such a complication. In these cases the vessels of the brain will be found injected, particularly the membranes, and there will be found an effusion of turbid lymph between the arachnoid and pia mater, and also more or less serum in the ventricles. In the highly congestive cases, where death has speedily resulted, we find few marks of disease about the throat; but the blood-vessels of the larger organs, particularly the brain, lungs, and liver, will be distended with dark-coloured blood. Dr. ARMSTRONG, in his work on scarlet fever, remarks, 'From the examination of several bodies after death, I am warranted in affirming that the brain, the liver, the stomach, the intestines, and the lungs are the parts most often inflamed, and that the inflammation in these parts is generally the cause of death, together with the affection of the throat.' But I have examined many cases where

in the worst forms of this disease most unsuccessful. This has arisen chiefly from our imperfect knowledge of the successive pathological changes produced by the scarlatinal poison, and from the varied character of these changes with the dose of the poison, with the constitution and circumstances of the recipient, with the season and weather, and with the prevailing epidemic constitution. It must be obvious that, if the earlier changes produced by the infecting or poisonous agent be either misunderstood or not recognised, the consecutive alterations will be very imperfectly, if not most injuriously combated, and that our means of cure will be either inappropriately selected or misdirected. When treating of FEVERS, I have insisted in several places upon the importance of promoting the secreting and excreting functions in all our attempts to *preserve from*, as well as to *cure*, these maladies; for it is chiefly by such measures as promote the depurating action of the emunctories on the blood, through the medium of the organic nervous system, as shown in several parts of this work, that these great ends of practical medicine can be attained.

92. i. PRESERVATIVE TREATMENT.—The fatality of the more malignant types of this malady induced physicians to recommend means for the protection of those exposed to infection; and these means were more frequently advised, and more generally adopted in former times than at present. The uncertain efficacy or

death could not be said to have resulted from either of these causes, for in two of them the patient died within nine hours of the attack, and nothing but congestion of the larger organs could be discovered. In some of these cases of congestive scarlet fever, the symptoms bear a striking resemblance to those produced by the narcotic poisons; there is the same abolition of sense, and the power of motion, frequently combined with convulsions, a contracted pupil, and laboured, or even stertorous respiration. The appearances on dissection are also the same. Hence I have been led to conclude that the contagious principle occasioning the disease is a specific virus of a gaseous nature, which, being introduced into the system through the medium of the blood-vessels of the lungs, acts, as narcotics also do, either upon the brain or spinal marrow, or both. These notions are in a great degree assumptions, it is true; but if any one can invent a more satisfactory hypothesis, I should be very glad to adopt it.

"2. *Lesions of the Fluids.*—With respect to lesions of the fluids in scarlet fever, so little progress has hitherto been made in animal chemistry that but little can be said with any degree of certainty. You are doubtless acquainted with NAUMANN'S hypothesis, which supposes that some change is wrought by the epidemic influence upon the properties of the blood, rendering its albuminous constituents incapable of being held in solution by the serum, in consequence of which the former exude upon the surface of the mucous membranes in form of a deposit, as we see about the throat and fauces in this disease. Again, it is the opinion of DIXON that in scarlet fever the secretions become highly acid; and, as GEDDINGS remarks, if we admit as valid the opinion of RASPAIL that fibrin is merely albumen coagulated by an acid, we thus acquire a reason why the serum loses its power of holding the albumen in a state of solution. But however this may be, there is most obviously a deterioration of the secretory and nutritive functions, owing, doubtless, to an impairment of the nervous energy. There is, consequently, a change in the constituents of the blood, either as to quantity or quality, or both, and a derangement of the vital forces, which renders them incapable of speedily repairing such lesions as are the result of the inflammatory engorgement, or even of throwing off the disease when violent in its attack. Owing to this same impairment of nervous power, there is a strong tendency to dissolution, both in the solids and fluids, manifested both by the rapid changes which occur after death as well as during life.

"The above remarks apply to scarlet fever at every age."

frequent failure of these means, and the hopes of escaping the more dangerous forms of the malady, probably induced a want of confidence in them, of which they are not altogether deserving, especially in some circumstances in which the disease presents itself.

93. Dr. WITHERING remarks, that during the prevalence of the malignant form of the disease in 1778, when every one was alarmed for himself or his connexions, means of prevention were anxiously inquired after. "Some smoked, some chewed, and others snuffed tobacco: some daubed their hands and faces with *thieves' vinegar*; many wore camphor at the pit of the stomach; and still more swallowed bark and port-wine. But those who were much conversant with the disease had too ample occasion to observe that none of these methods were effectual." But Dr. WITHERING had his own notions of prevention, based upon a supposition as to the mode in which the poison invades the frame. He believed that the scarlatinal poison "first makes its lodgment upon the mucus separated by the pituitary membrane lining the nose and fauces," and that those who are exposed to the infection should frequently spit out the mucus that collects in the fauces and promote the discharge from the nostrils. He farther advised those who already had imbibed the poison, and had experienced the premonitory symptoms, "immediately to take an emetic, frequently to wash their fauces with soap-leys diluted with water, and to snuff something up the nose that will make them sneeze." After the operation of the emetic he directed the patient to go to bed, and drink plentifully of wine whey with spirits of hartshorn. He states that a large experience enables him confidently to assert that, if these precautions be attended to, the infection will be either altogether prevented, or else very trifling in its consequences.

94. In the latest edition of Dr. WITHERING's treatise, and after an extensive experience, he adds, that the progress of infection may be stopped by precautions which may be adopted in almost every house. He had observed that, when boarding-schools were infected and the children were sent home, the disease was more widely spread; and that he, therefore, adopted the suggestion of Dr. HAYGARTH, and had for several years past never thought it necessary either to break up a school or to disperse a private family. "Allotting apartments on separate floors to the sick and the healthy; choosing for nurses the older parts of the family, or those who had already had the disease, and prohibiting any near communications between the sick or their attendants and the healthy, with positive orders instantly to plunge into water all the linen, &c., used in the sick-chambers, have universally been found sufficient to check the farther progress of infection." These recommendations are deserving of adoption, and confirm the opinion which I have stated above (§ 79). [I have in many instances adopted these or similar precautions where this disease has appeared in boarding-schools, and with the result of preventing its spread when early practiced. Free ventilation, however, is essential to its success. Where a person has been exposed, I have reason to believe that the liberal use of spirits of nitre, with magnesia or spirits of mindereri, will prove very successful in pre-

venting a severe attack, and, in some instances, of arresting it altogether. The depurating organs should all be kept active, if we seek to avert a severe attack.]

95. Dr. SIMS remarks, that the best preventive of the disease was found by him to be rhubarb, taken in the morning, in such quantity as should produce one loose motion in the day. He did not see one who used this confined afterward to bed, though several persons began it after they were infected, but before the time of their sickening. Dr. R. WILLIAMS considers Dr. SIMS's authority to be quite as veritable as that of HAHNEMANN, and his charm even more valuable than that of the latter. Probably any single *prophylactic*, of whatever kind, owes much of the influence it may exert to the confidence reposed in it by the person who has recourse to it. As fear favours, so does confidence resist infection; and when the object of confidence is such as promotes the several assimilating, excreting, and depurating functions, without lowering vital resistance, it combines the virtue of a *charm*—of a mental agent, with its physical operation.* The hypothesis of HAHNEMANN is, that diseases are best combated by remedies which produce morbid actions similar to those constituting the diseases themselves; and, consequently, as belladonna is capable of producing an efflorescence similar to scarlatina, that it is a preservative against this disease. He asserts that one eightieth part of a grain of belladonna, given twice a day, will preserve a susceptible person from an attack of scarlatina; or that three grains of the extract dissolved in an ounce of distilled water, and three drops of the solution given twice daily to a child under twelve months old, and one drop more for every year above that age, will be sufficient for this purpose. It is possible that belladonna, by its irritant and alterant effects (*see art. Poisons*, § 537, *et seq.*), may render the system insusceptible of the scarlatinal infection, independently of the principle or law for which HAHNEMANN has contended, empirically and absurdly, and in defiance of both reason and argument. It may possess this particular virtue, by producing its specific effects, without furnishing any support to the irrational doctrine, the monstrous absurdity, and the most nefarious practice, which he has originated and promulgated—a practice which knaves alone can adopt, and to which fools only will submit. It is obvious that belladonna can exert no protective influence until it produces, by the continuance of its use, or by its dose, its specific effects, and hence that, even admitting its efficacy, in virtue of these effects, it must frequently fail when it is not given in due season. As to its efficacy, opinions, even in Germany, are much divided; some, with ERMULLER, SPEUN, BERNDT, KOREFF, HUFELAND, &c., confiding in it; others, with SALZER, and several besides, stating that they have found it inefficacious; while many agree with HILDENBRAND in treating it with ridicule. [We believe that our author has conceded too much in allowing that belladonna may, by its "specific" effects, prevent an attack of scarlatina. We would almost as soon believe in HAHNEMANN's absurd-

* As this disease chiefly occurs among children, it cannot be supposed that fear or confidence have any great influence either in promoting or warding off an attack.]

ities as in that of the *specificity* of remedial agents, in the sense in which the term is generally used. Such a belief is the corner-stone of the homeopathic doctrine, and neither consonant to reason nor facts. Belladonna may, like other active perturbing and depurating agents, prevent an attack of scarlet fever after exposure, either by a powerful impression on the nervous system, or by promoting the activity of the secretory and excretory organs: in no other mode is such a result even conceivable by a rational mind. It is by virtue of its alleged "specific" effects, that HAHNEMANN supposes belladonna to be a preventive of this disease; but the mode in which this charlatan introduced this "specific" to the world as a secret preparation, sold at a *Louis d'or* per ounce, ought of itself to stamp it as one of those base attempts at imposition which from time to time appear, to disgrace not only our profession, but our common humanity. As to the efficacy of belladonna as a preventive of scarlet fever, there is but one opinion in this country, and that is of entire incredulity. Where the degree of contagiousness of a disease is subject to so many contingencies as this, and so little settled, it is unnecessary to attempt to show the fallacy of experiments made with this drug, as heretofore published. We have used it extensively for this purpose, but have never seen any good reason to believe that it possessed any more virtue than a hundred other articles in warding off an attack.]

96. Calomel was recommended by KREYSIG and SELIG as a prophylactic, and as tending to lessen the severity of the attack, when it failed of averting it altogether. THEUSSINK advised the calomel to be conjoined with the golden sulphuret of antimony. EICHEL believed in the efficacy of emetics, as advised by WITHERING, especially when they are followed by diaphoretics. Several writers have recommended the mineral acids. I have reason to believe that the nitro-hydrochloric acids are not devoid of efficacy as a prophylactic, and that capsicum may be placed in the same category, especially when conjoined with small doses of camphor and quinine. The most certain prophylaxis is, however, to be found in the adoption of those measures which I have fully detailed in the article INFECTION (§ 55, *et seq.*), when treating of its prevention and counteraction, and in that on PESTILENCE, PROTECTION FROM.

97. ii. CURATIVE TREATMENT.—It is obvious from what has been advanced, that the treatment of scarlet fever should be directed with strict reference, 1st. To the type and form of the disease; 2d. To the character of the prevailing or stationary epidemic constitution, as insisted on above (§ 10); and, 3d. To the pathological conditions, primary and secondary, to which I have endeavoured to direct special attention. With these objects in view, I shall first describe the means which are most appropriate in the different forms of the malady; and next remark upon the several remedies which have been recommended by the best authorities, and the circumstances in which they may be most beneficially resorted to. Without failing to give these authorities their due weight, I shall be guided chiefly by the results of my own observation and experience.

98. *A. Simple Scarlatina*—*S. mitis*—*S. sim-*

plex.—Mild or simple scarlet fever (§ 18) may require but little treatment beyond attention to ventilation and diet, and to the several excreting functions, especially if the febrile symptoms be slight. If, however, the pulse is quick, sharp, or rapid, or the skin hot, the quantity, appearance, and character of the urine should be carefully examined, and if this excretion be scanty, and the fever considerable, although the disease may appear simple and regular, yet it may assume, even in the course of a few hours, a much more severe form. If there be vomiting at the commencement; and more especially if the retchings be attended by pain in the loins or limbs, and scanty or suppressed urine, an emetic should be exhibited, and its operation be promoted by demulcent diluents and warm diaphoretics, and the functions of the skin be promoted by the tepid bath. The action of the emetic tends both to remove the congestion of the kidneys either already existing or apt to supervene in these cases, and to determine to the surface of the body. If the patient be strong or plethoric, and if the prevailing epidemic constitution do not contra-indicate this measure, a small or moderate cupping over the loins; and, in different circumstances, dry-cupping in this situation, may be practiced if the symptoms are not mitigated by these means. The bowels should be evacuated by suitable aperients—by one or two doses of calomel and antimony, followed by saline aperients, as the phosphate of soda, &c., taking due care merely to promote and to evacuate the secretions and excretions without causing unnecessary irritation.

99. The chief *intentions* directing our practice, in the milder cases of the disease, are, 1st. To prevent the increase of febrile action; 2d. To promote the excreting and depurating functions; 3d. To remove local congestions and determinations, whenever and wherever they occur; and, 4th. To preserve or to restore the functions of the skin and kidneys after the subsidence of the eruption, and during the process of desquamation. If we fail in the complete fulfilment of these intentions, the indications and means about to be described should be adopted, appropriately to the phases through which the disease may pass, and to the complications which may supervene. Although the mild and regular form of the disease generally proceeds favourably, yet, owing to many disturbing causes, and not infrequently in consequence of the *nimia diligentia medici*, it may assume a serious or complicated form, more especially when vital power is suddenly reduced, when excreting functions are interrupted, or when local determinations are favoured or occasioned.*

* [We must caution the American practitioner against the use of active cathartics, as the saline aperients, senna, jalap, &c., in this form of scarlet fever, and especially against the use of antimony, which is an absolute poison in every form of this disease. Owing doubtless to a change in the diathesis of this as well as other exanthematous affections, active cathartic or emetic substances are now known to exert a very deleterious influence upon their progress, and should therefore be sedulously avoided. We have known senna develop intestinal irritation, followed by diarrhoea, recession of eruption, and fatal collapse in numerous instances of simple scarlatina, which doubtless only required a mild, cooling regimen to have carried them to a successful result. And so also of antimony, which is extremely deleterious unless given in very minute doses and with great caution. Castor oil, lemonade well sweetened, and sponging the skin with

100. *B. Scarlatina anginosa*.—*S. inflammatoria*.—The more inflammatory types or states of scarlet fever generally require prompt and active measures. But it ought not to be overlooked, that the terms here employed to designate the more *sthenic forms* of the malady are altogether arbitrary—that many mild, as well as all the malignant states of the disease, are anginous; and that, whether simple, regular, mild, anginous, or malignant, it may also be inflammatory; the great and essential difference being the degree in which sthenic or asthenic action is present—in the amount of organic nervous or vital power, and in the state of the circulating fluids. This type or form of the disease requires a modified, or even very different treatment, according to the phases it may assume, and the grades of vascular action and vital power, as different or individual cases pass through the various phases from the mild to the inflammatory, or from the simple and regular to the complicated or malignant (§ 20).

101. (a) In the more *sthenic diathesis*, or *inflammatory* type, of this fever, an *emetic* of ipecacuanha, or of ipecacuanha and antimony, is generally of service, especially at an early period; and its operation should be promoted by warm diluents. It is not the less beneficial when vomitings are already complained of, and the urine is scanty, and pains in the loins are present. In these latter circumstances, especially when the pulse is full or strong, the abstraction of blood from the loins by *cupping*, the quantity taken being such as the age, habit of body, and peculiarities of the patient will warrant, is generally beneficial; but *bleeding* from a vein is seldom of service—more generally prejudicial, unless in the more sthenic diathesis and robust constitutions. If generally adopted, blood-letting is a destructive practice, unless in rare epidemic visitations, when the prevailing epidemic constitution admits of the practice, with such limitations and cautions as the nature of the disease and the peculiarities of the case suggest. During the stationary epidemic constitution, from about 1810 to 1820 or 1825, blood-letting, even in this disease, especially in its more inflammatory types, was much better tolerated than subsequently; and some writers considered their recommendations of it as sufficient to constitute it the chief remedy, in all circumstances, and for all time; denouncing those who had preceded them for advising different means, although more appropriate for the types of the disease for which these means were employed. More recently, and since late writers have ascertained that blood-letting should be most cautiously employed, even in the most inflammatory type, cupping on the nape of the neck, or the application of leeches behind the ears, has been advised for the more sthenic anginous form of the malady, and often practiced by myself for many years. But when pain in the loins and limbs, and scanty, high-coloured, or otherwise morbid urine, or suppression of urine, are present, I then have preferred the abstraction of blood by cupping over

the regions of the kidneys, to an amount dictated by the peculiarities of the case, and have prescribed the following *embrocation*, to be applied by means of flannel or spongio-piline around the neck and throat; or either of the *liniments* in the APPENDIX (see FORM. 295, 296, 307, 311) to be thus employed. If either of these applications produce external inflammation or discharge from the surface, the consequences are never troublesome, as sometimes observed when blisters are used.

No. 335. R Linimentū Terebinthinæ, ℥ij.; Linimentū Camphoræ Comp. ℥j.; Olei Olivæ, ℥iij.; Olei Cajuputi, ℥j. m. Fiat Embrocatio more dicto utenda.

102. When the emetic action has subsided, the bowels should be gently or moderately evacuated by means of *calomel*, either alone or with rhubarb or jalap, or with the addition of magnesia or the dried subcarbonate of soda; and followed by manna, salts, &c., in the infusion of roses or of senna; or by castor or olive oil, according to circumstances; or by equal parts of the compound infusions of gentian and senna, with the carbonates of soda and ammonia.

103. The great heat of skin in this state of the disease suggested a recourse to the *affusion of cold water* on the surface, as too strenuously and indiscriminately advised by Dr. CURRIE. When I commenced practice I adopted this treatment in scarlet fever, and extended it to several other diseases, and certainly with more benefit in them than in this; for, in the more sthenic forms, it was soon followed by an equal, or even by an increased heat of the surface, and in the more asthenic conditions it appeared to favour the development of internal complications: in most of the forms of the malady, it contingently favoured congestion of, or determination of blood to, the kidneys, and thereby aggravated the disease. I therefore relinquished the practice, and substituted the *tepid bath*, or the *cold or tepid sponging* of the surface, using simple or medicated fluids for this purpose, according to existing states of the fever, and preferring of the latter such as were emollient and alkaline.

104. After moderate evacuations from the bowels, saline mixtures or draughts, of a *diaphoretic and diuretic kind*, in a state of effervescence, will always be agreeable, and tend to moderate the febrile action, as the acetate or citrate of potass, with the acid in excess, in the more sthenic cases; or the acetate or citrate of ammonia, with the ammonia in excess, in the more asthenic; and with the spirits of nitric ether with either, will be generally appropriate. In this form of the disease, *gargles* have been very generally recommended, and are sometimes of service when their composition is such as suits the state of the case. Those which are cooling, or which contain the nitrate of potass, or the hydrochloride of ammonia, are the most grateful and beneficial. Children can use them only as washes for the mouth; but they are useful as such; and they may be injected into the mouth and throat of younger children; or a clean sponge, attached to a piece of whalebone, may be moistened with them, and be employed to cleanse the mouth and throat from time to time. The infusion of roses or of cinchona, or decoction of cinchona, or red wine and water, or camphor or rose water, may be employed as the vehicle for these

cool or tepid vinegar and water, and guarding against cerebral determination by cool applications to the head, and occasionally a mustard pediluvium, with the spirits of nitrous ether internally, will be found all the treatment necessary in the mild form of this disease, great attention, of course, being paid to ventilation and cleanliness.]

salts, or for the other substances which may be used in this manner. (See FORM. 158-167, in the APPENDIX.)

105. A prompt recourse to the means now advised will generally prevent the occurrence of the complications (§ 27, *et seq.*) often met with in this form of the disease, more especially if these means secure a free excretion of urine. But if any local determination or complication arise notwithstanding; or if it have taken place before the treatment was commenced, the agents used for combating it should have strict reference to the existing state of vital power. *Local depletion* will often be of service when power is not much reduced; but we must not expect that the complication, however inflammatory it may seem, is to be removed by depletions only or even chiefly. The pathological source of these complications, as already explained (§ 28, *et seq.*), will show the futility of the expectation. While the local depletion may tend to reduce the vascular fullness, local and general, means should be employed to rouse the action of the kidneys, to determine to the cutaneous surface, and to promote the secretions and other depurating functions. In the circumstances now being considered, there are no means more efficacious, especially in restoring the functions of the skin and kidneys, and in deriving from the seat of local affection, than flannel cloths coming out of hot water, freely sprinkled with the spirit of turpentine, or with the embrocation just prescribed (§ 101), and applied either over the epigastric and abdominal regions or over the loins. This *epithem* should be covered with oiled silk or with a warm napkin, so as to confine the fumes from it as much as possible to the surface of the body. In most of the complications of this form of the disease, the bowels should be preserved in a moderately open state, by the means already mentioned (§ 102), or by castor or olive oil; and their action may be promoted by the occasional administration of an *enema*, containing either or both these oils, with spirit of turpentine. The cooling diaphoretics and saline medicines advised above (§ 104) may also be given from time to time in a state of effervescence, or otherwise. If the bowels be irritated or too much relaxed, the liquor ammoniæ acetatis may be given with the ammonia in excess, and with the tinctura comphoræ composita or the sirupus papaveris; and the epithem or embrocation already prescribed should be assiduously applied over the abdomen.

106. (*b*) When the anginous or inflammatory form of scarlatina assumes more of the *asthenic* diathesis or type, and according as it approaches the malignant form, the treatment should be modified. In these states even local vascular depletion is either inefficacious or injurious. But *emetics*, especially early in the attack, are generally beneficial. The other means already stated are also of service, more particularly the terebinthinated *epithem* or *embrocation*, and the saline diaphoretics; and, if congestions of internal parts take place in this state of the disease, the epithem or embrocation should be energetically employed. If an aperient be required, a moderate dose of the spirit of turpentine should be added to the oils, advised above (§ 105), and be administered by the mouth, or as an enema, as the circumstances

of the case will suggest. In the less urgent or dangerous cases of this form, and in the complications which may supervene, the internal and external means already recommended will generally be appropriate; but the urinary excretion should always receive attention; and when it becomes scanty or suppressed, an ipecacuanha emetic should be given, and the terebinthinate epithem or embrocation be applied over the loins, and the spiritus ætheris nitrici and liquor ammoniæ acetatis be prescribed in sufficient quantity. In proportion as the case assumes, either primarily or consecutively, a malignant character, so ought the means about to be advised for the next form of the disease to be employed.

[The treatment of this form of scarlatina, as above directed, appears to us far more active than the disease often requires or will safely bear in this country. More die in this malady from the *nimia diligentia* of the physician than from the disease itself, and we therefore deem it our duty especially to caution the young practitioner against active medication; the experienced physician needs no such advice. With regard to general blood-letting, we have met with no cases for several years which would justify its employment, and leeches and cups for the throat affection prove, according to our experience, far less efficacious than local applications of a solution of nitrate of silver frequently repeated. We must protest entirely against antimonial emetics, or cathartics of "jalap," "senna," or "salts"—none of these can be safely administered in any form of scarlet fever, as it prevails at present, or has for several years past. Twenty years ago, we found the disease would bear bleeding and these active medicines far better than at present, and in an extensive dispensary practice were in the habit of resorting to them, until from change of diathesis, or some other cause, we were compelled to adopt a milder and less perturbing course of treatment. The inflammatory complications, which so often exist, do not yield to depletion as they formerly did, but, on the contrary, are aggravated by it. The injection of the capillary system, occasioning most of the phenomena of inflammation, is doubtless owing to depressed nervous energy, leading to loss of tone in the vascular system, and is to be combated by a mild cordial and supporting course, and not by means calculated to lower the nervous power, and thus indirectly augment the existing local congestions. As above noticed, the local application of nitrate of silver will, when practicable, be found one of the most important modes of meeting this indication, to be aided, of course, by mild stimulants, diuretics, and diaphoretics, and other secretory excitants. *Gargles* can hardly ever be employed with much effect in diseases of children, and we must therefore trust to applications made by the physician. Tepid sponging will prove equally beneficial with cold affusion, without being attended with any of its dangerous consequences. If the excitement is very high, one fourth of a drop of the saturated tincture of aconite may be given in water every hour to a child of three or four years, until the arterial action, heat, &c., have somewhat abated, which will generally be the case after a few doses; where a gentle cordial is needed, the *chloric ether* will be found one

of the most agreeable, as well as efficacious. Both these articles may be given with great facility to children of every age, and they will be found sufficient to fulfil two of the most important indications in the disease. If the disease assumes an asthenic type, we should not dare to resort to active *emetics*, as advised by our author, but would trust to wine whey, ammonia, chloric ether, quinine, and the turpentine embrocation.]

107. *C. Scarlatina maligna*.—*Malignant Scarlet Fever* (§ 20, *et seq.*), is often so sudden in its seizure and so rapid in its progress as to require the most efficient means with the utmost promptitude; and, if the means be either inefficient or delayed, the extension of the affection of the throat to the adjoining passages, and the supervention of complications, which vary or differ in different cases, are common results. The severity of the affection of the throat, in these cases, has frequently induced the practitioner to apply leeches to the neck or behind the ears; but they are generally injurious, more especially when the pulse is very rapid and compressible. Even local depletions, in this form of the malady, are rarely of service; and when leeches are applied to the neck or throat, diffusive inflammation of the cellular tissue, in connexion with enlargement of the parotids, &c., either extending from the internal parts, or excited more externally by the leeches, is not an infrequent result. Whatever may be the state of the urine—however morbid or scanty this excretion may be, as it usually is in these cases—an *emetic*, consisting either of ipecacuanha or of sulphate of zinc, or of both, to which a little pulvis capsici may be added, should be given without delay, and its operation be promoted by drinking a warm infusion of chamomile flowers, or of bark—the latter made weak in proportion to the quantity to be taken—and the terebinthinate embrocation or epithem ought also to be applied over the loins in the manner advised above. The throat should also be surrounded by either the embrocation or the epithem. In a very short time, the relief which the patient will experience, especially as respects the state of the throat, will be remarkable; but, to render the relief permanent or progressive, further means should be employed.

108. In this state, the decoction of *cinchona* should be given every three or four hours, with the carbonates of *soda* or *potash*, or *ammonia*, either in a state of effervescence, the alkali being in excess, with acetic or citric acid, or with the carbonate of the alkali only. If the decoction be not taken with the acid, the fixed and volatile alkalis may be given at the same time, with the addition of the spiritus atheris nitrici and tincture of serpentaria. It is often difficult to determine whether or not the decoction should be combined with an *acid* or with an *alkali*, in the more malignant states of scarlatina. The choice should depend, in some measure, on the state of the urine. If this excretion be not suppressed, and if it be alkaline or contain phosphates, the cinchona should be conjoined with *hydrochloric acid* and *hydrochloric ether*; or the *sulphate of quina* may be given, in the infusion of roses, with dilute *sulphuric acid* and *sulphuric ether*, or the compound spirit of ether. When, however, the urine is suppress-

ed, or nearly so, and when it presents an acid reaction, or is albuminous, or bloody, after having recourse to emetics and terebinthinate epithems over the loins, I have generally preferred a combination of the decoction of cinchona with the liquor ammoniæ acetatis and the carbonate of ammonia; or with either of the alkalies, in a state of effervescence with a vegetable acid. (See APPENDIX, FORM. 385, 388, 416, 437.) More than half a century ago Dr. GARNETT recommended the *chlorate of potash*, with or without the decoction of bark, in malignant scarlatina; and Dr. CLUTTON the *hydrochloric ether*. I have often prescribed them both since 1820, in public and private practice, and with marked benefit, in the malignant or putro-adyamic states of the disease, appearing either primarily or consecutively. If the symptoms are not ameliorated, an emetic should be again administered, and even repeated, but it should be conjoined with capsicum, or some other stimulant; and the decoction of cinchona, combined as above, should be continued afterward, with the addition of either the compound tincture of serpentaria or of capsicum, the embrocation or epithem being repeated, and the bowels moderately evacuated by the means already suggested (§ 102, 105).

109. In the more putro-adyamic or malignant states of the disease, *chlorine* and the alkaline *chlorides* have been given with benefit, either alone or conjoined with the means already mentioned; but the external applications advised above, and the evacuation of morbid secretions and excretions by emetics and the aperients already prescribed, should not be neglected. Frequent and considerable doses of powdered *carbon*, or charcoal, have also been given, and on several occasions by myself, conjoined with *quinine*, or powdered *cascarilla* and *cinnamon*, or with the addition of *camphor*, *creasote*, and two or three drops of the tincture of *capsicum*. These, mixed in treacle, have a good effect in correcting the morbid action and secretions in the throat and fauces, especially when aided by the application of the terebinthinate embrocation around the throat. When the throat and fauces are much affected in this form of the disease, as is generally observed, not only should these substances be taken, either in treacle, or in sirup or conserve of roses, or such other vehicle as would form them into a *linctus*, but the *gargles* mentioned above (§ 104), or those referred to in the APPENDIX, should be employed, in the manner there particularized, in the intervals between the administration of the other means. Gargles, however, are often unavailing, and in children can be employed only as washes in the manner already noticed. In the more severe and malignant affections of the throat and fauces, the application, by means of a brush, or sponge attached to a piece of whalebone, of a strong solution of *nitrate of silver* (3j. or ʒss. to an ounce of water), or of *alum in acetic acid*, will be much more efficacious, especially when early adopted. In this very malignant state of the disease, it may be necessary not to rest satisfied with quinine, or preparations of cinchona or serpentaria, capsicum, camphor, ammonia, chlorine, &c., as severally above prescribed, but also to give *wine*, or even *brandy*, with various farinaceous or dietetic substances, as sago, arrow-root, yolk

of eggs, &c., or with certain beverages, as Seltzer water, soda-water, or ginger-beer, or spruce-beer. [With regard to the malignant form of scarlet fever, we believe that there is great uniformity of practice among well-informed American physicians, and that their treatment is eminently judicious and successful. Depletion, in every form, is discarded; active emetics and cathartics are deemed exceedingly dangerous; while great caution is used not to weaken the already prostrated vital forces by harsh, active, or violent medication—wine, brandy, chloric ether, ammonia, quinine, with external revellents, and the local application of nitrate of silver, are the remedies on which our main reliance is to be placed. Simple enemata and castor or olive oil are all that will be required to remove morbid excretions from the alimentary canal. We have derived more advantage from chloric ether in this form of scarlet fever than from any other single remedy. It should be given as a depurative cordial and tonic, in small doses, and frequently repeated. Its effects on the capillary circulation are prompt, and of the most marked and beneficial character. Capsicum tea, containing a small quantity of ammonia in solution, is also an admirable remedy in the low and sinking cases of this dangerous malady. External revulsives are of very great value, tending as they do to equalize the circulation and remove local engorgements. The enlightened practitioner, however, knowing the indications, can select his remedies as the circumstances of the case demand.]

110. *D. Scarlatina sine Exanthemate*.—Scarlet fever without eruption should be treated with strict reference to the character of the attendant fever and to the state of the throat. Some of these cases present more or less of an inflammatory diathesis, while others are remarkably asthenic, or are attended by extreme depression of vital power. According as these different states occur, so should the treatment be directed, conformably with what has already been advanced. When vascular depletion is indicated in this form, the evidence which I have observed of congestion of the kidneys and the state of the urine have induced me to direct *cupping* on the loins, followed by the terebinthinate *epithem* or *embrocation*, in that situation; and around the neck and throat, if the fauces are much affected. I have already contended that the primary affection of the kidneys, in this form of the malady, very often prevents the development of the cutaneous eruption, and that the consequent imperfect depuration of the blood by these organs causes various internal complications. The removal of this congestion or affection of the kidneys should, therefore, be a primary intention of cure; and when the state of constitutional power does not admit of vascular depletion, as now advised, it should be attempted by the exhibition of *emetics*, by *dry-cupping* on the loins, and by the terebinthinate application already mentioned. *Purgatives*, especially those already mentioned, administered by the mouth or in enemata, and the other means specified above, according to the character of the fever and state of vital power, are generally also required. In this form, various complications are apt to appear, either at an earlier or at an advanced stage, generally owing

ing to the pathological cause already assigned. The head, the lungs, the pleura, or the digestive mucous surface, &c., or even two or more of these, may manifest the most serious and even the most rapidly disorganizing change, and require the most efficient and prompt measures. If the morbid action approach, and according as it possesses a sthenic character, local vascular depletions are necessary; but no dependence should be placed on those alone. The functions of the kidneys should be strictly examined, and the treatment be directed to them. Cupping or dry-cupping, followed by the terebinthinate applications, in that quarter, emetics, saline diaphoretics conjoined with diuretics, warm medicated baths, especially warm baths containing salt or carbonates of the alkalis, with mustard, are among the chief means of cure in these and similar cases. When vital power appears extremely depressed or exhausted, the tonic and restorative remedies advised above (§ 108, 109), must be prescribed in order to resist the tendency in these circumstances to contamination of the circulating fluids and to fatal sinking.

111. *Blisters* have been recommended by many as derivatives, especially when internal complications occur in this form of the malady; and in adult subjects they are often of service, although not so immediately and generally beneficial as terebinthinate epithems and embrocations, when these latter are judiciously employed. In children, blisters, even when cautiously managed, are often dangerous applications in scarlatina. Mustard poultices are preferable, but are much inferior in efficacy to the terebinthinate embrocation.

112. When the affection of the *throat* is very malignant or threatens to extend to the adjoining passages, especially if it advances to the *larynx*, then emetics, especially such as have been advised above (§ 107), should be administered, and the constitutional powers fortified by tonics, so as to resist the extension of the local mischief; and the throat and neck should be surrounded by a terebinthinate epithem or embrocation. Blisters in these cases are generally more injurious than beneficial; and the same may be said of *mustard poultices*, when applied to the throat. Emetics consisting chiefly of mustard have been given in these cases, but they often irritate the throat too much during deglutition, and are not so immediate or certain as the sulphate of zinc or ipecacuanha, or as a combination of these. When an ichorous or excoriating discharge proceeds from the throat, fauces, &c., or when these parts indicate or manifest a sphacelating state of ulceration, then the application of *pyroligneous acetic acid* with *creasote*, or the strong solution of *nitrate of silver*, prescribed above (§ 109), by means of a sponge, to the affected surface, or the use of *gargles* containing these substances, with the addition of the tinctures of *myrrh* and *krameria*, and the administration of *tonics* and *restoratives* internally, are chiefly to be confided in.

113. *E. Scarlatina Latens*—*Latent, suppressed, or masked Scarlet fever*, in which neither eruption nor sore-throat appears, is comparatively rare, but it is a most serious, and often a fatal form of the disease when it occurs (§ 26). It would seem, as above stated, that the scarlati-

nal poison or infection primarily affects the kidneys in this form, or both the kidneys and serous membranes, primarily and chiefly; the affection of these parts preventing the development of the disease in the throat and skin, and rapidly increasing the contamination of the blood, and the effusion into serous cavities. In these cases, the disease has proceeded to effusion either into the cellular tissue, or into a serous cavity, before medical care is required. In all the instances which I have seen, the urine was either suppressed or very scanty, albuminous and sometimes bloody, from the earliest period of the recognition of the nature of the affection; and there were, moreover, febrile symptoms, with sickness and vomitings, and pain in the loins and limbs, for at least one, or two, or even more days, before any indications of oedema or internal local affection had appeared. When, therefore, these phenomena are observed in susceptible persons, in the same family, house, or locality in which scarlet fever prevails, then should energetic measures be instituted to remove the active vascular congestion manifestly existing in the kidneys, and not infrequently also in other parts, and rapidly inducing farther and most irremediable changes. But these measures should, as in other circumstances of the malady, have strict reference to the existing states of vascular action, in connexion with constitutional power or resistance. *Cupping* over the loins, or even a repetition of it, and immediately or soon afterward procuring full vomiting by *emetics*, are the means which should be first and promptly employed. When blood cannot be farther abstracted without risk, then *dry-cupping* may be substituted; and terebinthinate *epithems* or embrocations should be applied over the loins, or over the region of the prominently affected organ or part, and repeated or persevered in, according to the effect produced on the system and on the local affection, and more especially on the functions of the kidneys. In some cases it will be most advisable to cause the patient to be placed in a *tepid* or *warm bath* after the cupping and operation of the emetic; and the effect of the bath may be increased by adding either the carbonate of potash or the carbonate of soda, or common salt, and the flour of mustard to the water, so as to determine to the surface of the body, and procure a free cutaneous exhalation. This intention will be promoted by applying, immediately after the patient is removed into bed, the terebinthinate epithem or embrocation, as just advised, and by prescribing *saline diaphoretics* and *diuretics*, especially such as contain the liquor ammoniæ acetatis and spiritus ætheris nitrici. The state of the bowels also requires attention. A full dose of *calomel*, either alone or with an *antimonial*, should be given after the operation of the emetic, and even repeated after a few hours; and some hours afterward, either of the *purgatives* mentioned above (§ 102) ought to be administered, and be followed by the terebinthinate *enema*, if the evacuations be not sufficiently free; or if a purgative be subsequently required, without interfering with the exhibition of the diaphoretics and diuretics indicated by the state of the case. As this form of the malady is usually more or less complicated (§ 26), the means about to be farther suggested in respect of the

complications of scarlatina are equally applicable to it as to the other forms of the malady.*

114. *F. The complications of scarlatina* are often the chief causes of danger, and hence require the most active and best devised means. The remedies which most of these complications require have been in great measure anticipated by my remarks on the curative treatment of the several forms of the malady, for it is inconsistent with the due consideration of the subject to separate the complicated, and hence the most severe states of these forms from those states or phases into which they insensibly pass. There remain, however, a few prominent topics, or pathological conditions of importance, which occasionally present themselves as dangerous emergencies, and which require a more especial notice.—(a) I have already insisted sufficiently on the prominent *affection of the kidneys* (§ 28), which may be detected at an early stage of many of the more severe and complicated cases of scarlatina, and have fully stated the means which I believe to be most efficacious in removing it, viz., cupping, or dry-cupping, or both, on the loins, followed by emetics, terebinthinate applications, the tepid or warm bath, simple or medicated, diaphoretics and diuretics, &c.

115. (b) The extension of an asthenic or *diffusive form of inflammation* from the throat and pharynx to the *larynx*, or along the *Eustachian tube to the ear* (§ 30-32.), is to be prevented chiefly by emetics; by the application of terebinthinate epithems around the throat; by tonics or restoratives, in order to increase the vital resistance to the spread of the local mischief; and by antiseptic and astringent gargles, washes or similar applications tending to correct or arrest the local morbid action (§ 104, 109). *Hæmorrhage* from the nose, throat, or ears requires consideration. If it take place from the nose—*epistaxis*—and especially if the patient be subject to this occurrence, it may prove critical, especially in the more inflammatory or sthenic cases, and should not be prematurely interfered with. But an intercurrent epistaxis, even in these cases, if too profuse, but still more readily in the malignant or asthenic, may so reduce vital power, as shown above (§ 33), as rapidly to sink the patient. Therefore, in this latter state of the disease, and especially when the blood proceeds from the mouth, throat, or ears, the hæmorrhage should be arrested, if possible, as soon as may be, by the astringent gargles or washes for the mouth already mentioned (§ 104, 109), especially those containing the pyroligneous acetic acid and creasote. The difficulty of arresting the bleeding is always the greatest in the most malignant cases, owing to the state of both the blood-vessels and the blood circulating in them. In these

* [The diagnosis of this variety of the disease is very obscure, and probably its true nature is generally not understood. In these marked forms of disease our investigation should be carefully conducted and our treatment cautious, but based on the existing general indications. The name of the affection is of no value, therapeutically considered, and we shall seldom go amiss if, indifferent to nosological terms, we keep a steady eye upon the pathological states of the nervous and vascular system. Such knowledge will often supply, and more than supply, extensive experience when unenlightened and undirected by true science. The directions of our author are marked by enlarged views and correct pathology, and are no less in accordance with the experience of the best observers and practitioners.]

cases the attempt to arrest it should be made early; and if the means already indicated, aided by tonics and astringents taken early, should fail, the administration of the spirits of turpentine internally, either in considerable or frequently repeated doses, ought not to be delayed; for this is one of the most energetic anti-hæmorrhagic medicines which can be prescribed, if, indeed, it be not the one chiefly to be relied upon in these and similar cases.

116. (c) *When diffusive inflammation of the cellular tissue of the neck or throat occurs* (§ 34), then the most active tonic and stimulant remedies are required, in connexion with antiseptics, both internally and externally. The selection of these should be made, as already advised (§ 108), with reference to the state of the excretions, and more particularly of the urine, the same indications guiding the choice as have been there mentioned. The means which have been already advised for the most malignant form of this malady (§ 107, *et seq.*), and for *diffusive inflammation of the cellular tissue* (see CELLULAR TISSUE, § 34, *et seq.*), are also appropriate in this complication.

117. (d) *Gastro-enteric disorder with diarrhæa* (§ 35) is a frequent occurrence, and requires an early recourse to astringents, antacids, and aromatics, especially when it is consequent upon malignant affection of the throat, and is attended by suppression of the eruption. In these circumstances coma soon supervenes from exhaustion, if vital power be not duly supported by suitable tonics and stimulants. The warm bath, containing salt and mustard; terebinthinate embrocations over the abdomen after coming out of the bath; the infusion of cascarrilla or of cinchona, or the decoction of the latter, with lime-water, or with ammonia, camphor, compound tincture of camphor, casticum, or other aromatics, or aromatic confections; wine or brandy, with spices, in farinaceous preparations, as advised above (§ 109); or the means which are recommended in the enteric complications occurring in continued fevers (see FEVERS, § 549, *et seq.*) and in MEASLES (§ 75, *et seq.*), are severally beneficial. I have recently prescribed *salicine* in this complication with great advantage, in doses varying with the age and severity of the bowel affection, and in conjunction with the substances just mentioned in the more obstinate cases. The bark of willow may be given in decoction, infusion, or powder (from 5 grains to ʒij.); or the *salicine* in doses of one grain to five or six.

118. (e) *Convulsions, coma, &c.* (§ 36), are most unfavourable complications, although not necessarily fatal. The former occur chiefly in young children, sometimes on the accession of the disease; the latter in both children and adults. They are both, even when occurring early, often consequences of obstruction of the urinary excretion, although the cause is generally overlooked. When these affections appear early, and manifestly from this circumstance, cupping over the loins, or the application of a few leeches in this situation in young children, the warm or tepid bath, terebinthinate embrocations on the back, and active purgatives, are generally required. When the symptoms in other respects display no putro-adyndamia, and when the pulse retains some strength as well as fulness, then vascular depletion is more ben-

eficial than in some states in which it is more commonly resorted to. Calomel, with antimony or jalap, and followed by other purgatives, especially by castor oil and spirit of turpentine, and by terebinthinate enemata, are generally necessary. When coma is obstinate, then a full dose of spirit of turpentine, according to the age of the patient, with asafætida and camphor, should be administered as an enema; and, as soon as the bowels are freely evacuated, saline diaphoretics and diuretics may be given. In some severe cases of this complication, I have directed the head to be surrounded, and the vertex to be covered by flannel moistened with turpentine, or with the terebinthinate embrocation prescribed above (§ 101). During the treatment the state of the urinary function should be carefully ascertained, and if it be suppressed or scanty, endeavours should be made to restore it, and at the same time to excite other emunctories or depurating organs to increased action, especially the skin and bowels. The existence of coma or convulsions should not prevent the administration of emetics, when the measures just advised have failed; for the emetic action both rouses the action of the kidneys and determines to the surface of the body, while it procures a discharge of fluid from the digestive mucous surface, thereby relieving the vascular system from a portion of the serous fluid over-distending it, and congesting the vessels of the brain.

119. (f) The appearance of either of the *affections of the lungs, bronchi, or pleura* (§ 37, 38), or even of the *peritoneum* (§ 39), which often complicate the severer cases of scarlatina, especially the forms unattended by eruption, requires both judicious and prompt measures. If either occur during the eruptive stage, and more particularly if it be followed by the sudden disappearance of the eruption, local blood-letting is generally necessary; but the quantity of blood which may be taken, and the propriety of taking any, as in all other circumstances, should depend upon the state of the pulse, upon the existence of deficient vital power, or of putroadyndamia, and upon the state of the urinary function. Cupping, or the application of leeches, followed by dry-cupping, and the terebinthinate embrocation or epithems, assiduously or repeatedly applied, are the principal means of cure. But we should not confide too much in vascular depletion even in these complications, especially in some epidemics, and in certain localities which depress vital power and render the disease either malignant or complicated (§ 85). The external applications just mentioned are often more beneficial than any other means, especially when aided by appropriate internal remedies, as the liquor ammoniæ acetatis, spiritus ætheris nitrici, and moderate doses of camphor. It sometimes becomes a question as to the situation in which local depletion and external applications should be employed. If in these complications, as not infrequently observed, the urine is either suppressed or very scanty, or bloody, or albuminous, the local affections being the consequences of obstructed elimination and depuration by the kidneys, the loins are the situations in which these means should be applied, especially in the first instance; but otherwise over or near the chief seat of local complication. In other

respects the treatment may be the same as just advised for coma or convulsions (§ 118).*

120. *G. The sequelæ of scarlatina* are sometimes more dangerous than the primary disease. The consecutive affection is generally caused by errors in diet or regimen during the process of desquamation, and during recovery; and the treatment should, therefore, be directed with reference to these causes. During early convalescence the digestive functions are weak, and the primary processes of assimilation are imperfectly performed, unless the nature and quantity of the aliment be such as will be readily and perfectly disposed of. As the appetite during convalescence is greater than the power of digestion, food is often taken of a kind and quantity furnishing a chyle unsuited, owing to imperfect digestion, to the state of the blood, and which, in conjunction with the large proportion of effete materials, absorbed from the various tissues and surfaces, and carried into the blood during the advanced stages of the disease and during convalescence, renders the blood either too irritating or otherwise injurious to the excreting structure of the kidneys; and this effect upon these organs is heightened by the interruption to the eliminating or depurating function of the skin during early convalescence, the kidneys thus sustaining, during this period, the whole burden of depurating function, at a period, moreover, when the blood most remarkably and unusually abounds in hurtful and irritating materials derived from imperfect assimilation, and from the absorption and accumulation of effete molecules and structural elements derived from the several tissues—these elements or materials constituting the urea, uric acid, animal extractive matters, &c., forming the products of a destructive assimilation, or the ultimate products of animalization. It must be further manifest that if the blood, thus loaded with effete or irritating materials, be determined in unusually increased quantity to the kidneys by exposure to cold, by damp clothes, or insufficient clothing or other causes, even by great humidity of the air, these organs will sustain, as respects their minute excreting structure, more or less irritation or other injury, interfering with or interrupting their eliminating function, the blood thereby becoming still more impure, and consisting of an increased proportion of watery and extractive constituents, as already more fully contended for (§ 28, *et seq.*). These causes and their effects upon the frame—the primary effects now shown, and the secondary effects, constituting the several sequelæ of the malady—being manifestly and certainly those just stated, it follows, that the means most appropriate to the removal of the secondary effects or sequelæ are such as will most efficiently re-

move the causes and primary changes which produce the secondary effects or sequelæ, whatever these latter may be.

121. Conformably with these pathological principles, the treatment should be directed, 1st. To the state of the kidneys, as indicated by the condition of the urinary function and excretion, and by other signs or symptoms; 2d. To the causes, extrinsic and intrinsic, remote or pathological, of the state of these organs; and, 3d. To the secondary affection, or sequelæ, resulting generally either from the persistence of some lesion which originated during the course of the malady, or from the affection of the kidneys caused as just shown (§ 120).

122. (a) *The prevention of the affection of the kidneys*, upon which the most frequent of the secondary diseases or sequelæ of scarlet fever chiefly depend, should be a principal object in the treatment of this malady. During desquamation and early or advanced convalescence—for a month at least after the disappearance of the eruption—the patient's diet and regimen should be strictly prescribed, however mild the disease may have been. The food should be bland, light, and digestible, chiefly farinaceous, so that as little as possible of the irritating materials to the kidneys should accumulate in the blood. The beverages of the patient ought also to be of a bland or demulcent kind, and consist chiefly of soft or distilled water, wine and malt liquors being avoided. Exposures to cold, currents of air, to humid and cold states of the atmosphere should be carefully prevented, and the clothing ought to be warm. The due restoration of the functions of the skin should be attempted early in the stage of desquamation by recourse to tepid or warm baths, in which a quantity of the sub-carbonate of soda or potash, or bichloride of soda is dissolved; and the secretions and excretions duly promoted by purgatives or aperients, and by diaphoretics. By attention to these, the sequelæ of scarlatina proceeding from obstruction of the kidneys will rarely be observed.

123. (b) If, notwithstanding these precautions, or owing to the neglect of them, the state of the urinary excretion or other symptoms indicate congestion or obstruction of the kidneys (§ 49), the treatment should be directed chiefly to these organs. Unless the constitutional powers have been, or still are, extremely depressed, the antiphlogistic regimen, medicinal and dietetic, ought to be adopted. As this affection is so often the result of overfeeding during convalescence, or of a too early recourse to animal food and exciting beverages, these causes should receive due attention; and if the mischief can be referred to them, not only ought they to be prevented, but the removal of the disorder should be attempted chiefly by means of local depletion from the loins, of purgatives and diaphoretics, by the tepid and warm bath, and by terebinthinate epithems or embrocations applied over the regions of the kidneys. The vascular depletion may even be repeated, for it is not unusual to find the sequelæ of scarlatina to require, and the patients affected by them to tolerate, the bleeding more than in any of the previous stages of the malady.

124. (c) When *anasarca* or *effusion into any*

* [It is scarcely necessary to add anything to the very full history above given of the treatment of the various forms of this singular malady. It is impossible to give directions of uniform application, owing to the infinite shades of difference it assumes in different cases. Everything must therefore depend on the judgment of the practitioner and his skill in meeting existing indications. The congestion of the kidneys is a feature in the affection too much overlooked or disregarded in this country, and we would therefore call particular attention to the pathological condition of these organs in the treatment. Cups and leeches to the loins, as enjoined by Mr. COPLAND, should more frequently be resorted to in addition to the other means already recommended.]

serous cavity, or from any serous surface (§ 50–55), is consequent upon this disease, in the manner now shown, the effusion, in whatever situation it may occur—between the membranes, or in the cavities of the brain, in the pleura or pericardium, in the peritoneum, or in the capsules of the joints—is the consequence of active determination of blood to, or of irritation of, these membranes, caused by vascular excrementitious plethora, as above contended for (§ 28, 120); and if it should occur independently of these states of vascular action, it may be admitted as a very likely means to excite these states, owing to the morbid or irritating properties possessed by it, especially when it is retained long in any of the cavities formed by these membranes; so that upon post mortem examination it may be difficult to determine whether or no such inflammatory appearances as are found are actually the cause or the effect of the effusion: it is not improbable that they are in some measure both the one and the other. But it is not merely effusion into shut cavities which may follow upon obstruction of the urinary and cutaneous excretions after scarlatina, but a form of *congestive inflammation* of parenchymatous organs (§ 57), characterized by more or less *œdema* or serous infiltration of the affected organ, may supervene, or this latter affection may be associated with serous effusion into the adjoining serous cavity—an association which is frequent, and although the extent of the internal lesion may escape detection during life, or the one part of the mischief may mask the other, examination after death discloses the combination. I have on several occasions found, on inspection of cases of this description, the lungs condensed more or less by the infiltration of a watery lymph, and serous effusion in both pleural cavities; and in other cases the substance of the brain vascular, watery, or œdematous, although there existed also serous effusion into the ventricles and between the membranes. These are among the chief lesions which destroy life after attacks of scarlatina, and are merely the remote effects of the arrest of the eliminating or depurating functions, to which I imputed so great importance many years since, in the articles on the BLOOD, DISEASE, FEVER, &c.

125. It is obvious that the *treatment* of these affections ought not to be directed to them only or chiefly, but to the pathological causes or states of which they are the effects—to the obstructions of the kidneys and skin. However much blood-letting may be indicated by the state of the pulse and other circumstances of the case, a chief dependence ought not to be placed on it, even when apparently most required, but other active agents should be brought into operation, more especially purgatives, the tepid or warm bath, medicated as above (§ 122), terebinthinate epithems or embrocations over the loins or seat of local affection, after local depletions in either or both situations, and diaphoretics, followed by diuretics. These means are appropriate in the several sequelæ of scarlatina, the chief differences as respects either sequelæ being the extent to which each of them may be employed, and the succession in which they may be prescribed so as to obtain the greatest amount of benefit. After vascular depletions have been carried suffi-

ciently far, dry-cupping will then be of service; and after terebinthinate epithems have been applied, oleaginous purgatives and enemata may be administered, containing spirit of turpentine in sufficient quantity to excite the organic functions, to restrain effusion, and to stimulate the kidneys. In most respects the treatment of the sequelæ of scarlatina is the same as that of the complications (§ 114, *et seq.*); and it should be based on the same pathological and therapeutical principles.

126. (d) I have noticed among the sequelæ of this malady, the *extension of disease to the ear*, to the *cervical vertebrae*, &c., to the *parotid glands*, the *surrounding cellular tissue* and *lymphatic glands*, &c. (§ 46–48), giving rise to more or less chronic disease of these parts; but it is unnecessary to add, at this place, anything to what has been stated respecting these lesions in the articles CELLULAR TISSUE (§ 34, *et seq.*), EAR (§ 29, 30), PARALYSIS (§ 29, *et seq.*), PAROTIDS (15, *et seq.*), and SPINE. It has also been remarked that affections of the large, but more frequently of the small *joints* (§ 57), or even of both, may occur at any period after the subsidence of the eruption; and that *erysipelas*, or even *gangrene* of an extremity, may thus supervene. When the *joints* are affected, the synovial membranes are the chief parts implicated, and generally in consequence of the same pathological conditions as have been shown to originate with the emunctories; and these conditions, by contaminating the blood, affect these parts in an analogous manner to the affection of the serous membranes; and in some instances, and in certain epidemics especially, give rise to severe pains, resembling those of gout or rheumatism of the joints. In these cases the treatment should not vary much from what has been advised for articular rheumatism or gout. Generally warm anodyne fomentations, or a combination of these with terebinthinate embrocations, and the use internally of the means already advised, and particularly of such as the state of the urinary excretion will suggest, are sufficient to remove this consecutive affection. If erysipelas or either of its consequences should appear, the treatment for that disease ought to be adopted.

127. iii. REMARKS ON CERTAIN REMEDIES ADVISED FOR SCARLATINA.—After the full exposition of the *treatment of the several forms, complications, and sequelæ of scarlet fever*, which I have endeavoured to give, my remarks on this head will be brief, and be confined to those means which are most important.—(a.) *Blood-letting*, either general or local, or even both, have been recommended by BORSIERI, SCHRAEDER, GRUNDMANN, ARMSTRONG, CRAIGIE, and many others; but the impropriety of having recourse to it generally, or even frequently, in some epidemic prevalences of the malady, has been demonstrated by very numerous authorities. It would be improper to decide categorically either in favour or against the practice; for the character of the prevailing epidemic constitution, of the existing form or type of this fever, and the several circumstances of the case and of the patient, may render vascular depletion either most beneficial or most injurious. The propriety of the practice and the benefit resulting from it must necessarily depend upon the judgment of the physician, as respects not

only the peculiarities of the case that especially require it, but also the extent to which it should be carried, and the period and mode in which it should be resorted to. If the practice be adopted sufficiently early in the attack, and be aided by judicious means, *local bleeding* by cupping over the loins will be sufficient. A quantity of blood, as large as the exigencies of the case can require, may be taken in this way, and with a more decided effect as respects the organ which is most concerned in developing the most serious complications and symptoms of the malady, and in producing those changes which are usually termed malignant. In very young children a few leeches may be substituted, but the quantity taken by cupping is correctly ascertained, and hæmorrhage is prevented from being troublesome. The loss of blood in this way is also less felt, and less injurious than by venesection, in doubtful cases; and even when early employed in those cases or epidemics which seem to contra-indicate the propriety of it, much less injury results from this mode than by any other.

128. (*b*) *Emetics* have been strongly recommended by FOTHERGILL, WITHERING, STOLL, JOHNSTONE, CLARK, LENTIN, HUFELAND, and many others; but they have been unaccountably neglected in modern practice. I can assert that there is no remedy more generally appropriate—so suitable to all forms of the disease, if the substance be duly selected, and the periods of exhibition altogether proper. In most instances an emetic should be given as early as possible, and when given thus early, and before the type or character of the disease has fully declared itself, then ipecacuanha, or this with sulphate of zinc, may be preferred. When the disease is more fully developed, and assumes a sthenic or inflammatory character, then emetic tartar, or a combination of this with ipecacuanha, may be prescribed, and cupping over the loins to an amount indicated by the symptoms and its effects may precede the emetic. When the disease presents malignant characters or manifest adynamia or putro-adynamia, then sulphate of zinc with capsicum, &c., may be preferred, and dry-cupping only be employed. An early recourse to emetics frequently prevents the occurrence of inflammatory symptoms on the one hand, and of malignancy on the other. But the exhibition of them, especially of the one last named, should not be confined to the earlier periods of the malady. The state of the throat, or the extension of disease to the larynx, may require a recourse to this practice oftener than once during the course of the disease; and in the low or advanced states of the malady the combination of the emetic, whether ipecacuanha or sulphate of zinc, with stimulants and hot spices, will be of advantage. When tartar emetic is prescribed as an emetic in divided doses for children in scarlatina, it sometimes fails of producing this effect, and if the exhibition of it be persisted in, even for a short time, it may produce dangerous or even fatal sinking, although the form of the disease may have been more than usually sthenic or inflammatory when it was first prescribed.

129. (*c*) There are few remedies which require more judgment in their exhibition and selection in scarlatina than *purgatives* and *aperi-*

ents; for if they be given at the period of eruption, especially when the efflorescence is being evolved, they may interrupt the regular course of the disease; and if they be too long omitted, the retention of morbid secretions and excretions may be equally detrimental. If, again, they are of a too irritating kind they may develop an enteric complication, or, in the more asthenic forms, seriously depress or exhaust the patient. They are often exhibited with much benefit, as already advised (§ 102, 165), after an emetic has operated, when the patient is first attacked, and before the eruption begins to appear. After this period, or during the eruption, if the disease assumes a regular course, mild aperients, sufficient merely for the prevention of accumulations of the excretions, are only required. If, however, determinations to the head or suppressed function of the kidneys supervene, then the more active purgative, conjoined with calomel, terebinthinate enemata, &c., already mentioned, are of service. When the disease assumes an asthenic or malignant form, the purgatives should be conjoined with tonics, stimulants, and aromatics, as with cinchona, cascarilla, gentian, ammonia, spices, &c. In the more regular forms, purgatives are generally of greater service upon the disappearance than during the continuance of the eruption, and in every circumstance the combination with them of the alkaline carbonates or sub-carbonates is most beneficial. The indications for or against a recourse to purgatives, and the choice of them, depend upon the type, form, and complication of the disease, and upon the states of the alvine functions and evacuations, which ought to be always carefully examined.

130. (*d*) Preparations of *cinchona* and other *tonics* have been much employed in the treatment of the malignant and asthenic scarlatina; and in these forms especially, after the exhibition of emetics and after morbid secretions and excretions have been duly evacuated, and after cupping or dry-cupping has been employed, in cases requiring either or both, these medicines are most beneficial; much, however, depending upon the selection and combination of them with other means. Vascular depletion early in the disease may be beneficial, and yet the exhibition of tonics may be imperatively required at a more advanced period. But a recourse to the latter should very much depend upon the state of the urinary function. Most of the earlier writers on the disease since the time of MORRIS, and especially those who observed chiefly the more malignant types, have insisted much upon the necessity of recourse to *cinchona*, in the forms either of powder, decoction, or tincture, especially HUXHAM's tincture. But even in these types this medicine is best prescribed as just advised; and if the urine be suppressed, bloody, very scanty, and very high-coloured, cupping even in these ought to precede the administration of this remedy. In cases which suggest doubts of the propriety of having recourse to it, the infusion or decoction, conjoined with the liquor ammoniæ acetatis, with the acid or with the alkali in excess, or with nitrate of potash, according to the peculiarities of the case, and with spirit of nitric ether, will never be injurious, but most frequently very beneficial. When symptoms of malignancy are unequivocal, and the urine not

suppressed, the decoction with the compound tincture of cinchona, or with tincture of serpentaria and carbonate of ammonia, and sometimes also with the bicarbonate of potash or soda, will be of service; or the mineral acids, especially the *hydrochloric* or *nitro-hydrochloric acid*, with the ethers, may be given in the decoction of the cinchona when the urine indicates the propriety of exhibiting these in preference to the alkaline carbonates. If the bark affect the bowels, the *cascarilla* or *willow bark* may be substituted, or *salicine* may be employed. Other tonics, or tonic febrifuge preparations, may be prescribed in mild cases; but in the malignant type, these just mentioned, or the sulphate of *quina* conjoined with camphor, and other substances noticed when treating of the malignant form of the malady (§ 107, *et seq.*), are most deserving of adoption.

131. (c) *Stimulants* are required in the asthenic forms of the disease, and often at an advanced stage of the more sthenic type, but generally in conjunction with other means. The *sesquicarbonate of ammonia* was strongly recommended by PEART, and is certainly often most beneficial when combined, as above advised, according to the peculiarities of individual cases. It is frequently prescribed in too small, and consequently in inefficient doses; and the same remark applies to the *ethers* and their preparations. When a tonic and antiseptic effect is desired, ammonia should be conjoined with the preparations of cinchona and camphor; and when a diaphoretic action is indicated it should be given with the solution of the acetate of ammonia and spirit of nitric ether. The ethers are most useful when the patient complains of sinking faintness, or leipthymia. With quinine and compound infusion of roses, *sulphuric ether* may be preferred; and with the decoction of bark and hydrochloric acid, or the nitro-hydrochloric acid, *hydrochloric ether* may be prescribed. The *chlorate of potash* may be conjoined with tonic infusions or decoctions, or with alkaline carbonates and ether; and in the more malignant states of the disease these medicines should be ordered in frequently repeated doses, and be farther aided by *camphor*, *musk*, *serpentaria*, or *capsicum*. The combination of camphor with spirit of Mindereri was much confided in by HUFELAND in this class of cases. A recourse to *wine*, or even to *brandy*, in the forms mentioned above (§ 109), may not only be of service, but even indispensable, in the more asthenic and malignant states of the disease.

132. (f) *Diaphoretics* and *diuretics* are medicines of great importance in this disease. The functions of the skin and kidneys are interrupted by the active vascular congestion, and by the alteration of the organic nervous influence of these parts, and therefore, while means are being used to equalize the circulation and to relax the cutaneous surface, medicines should be prescribed to aid these intentions, and to rouse the secreting and depurating actions of these organs. In the more sthenic or inflammatory types, and at the commencement of the disease, the antimonial diaphoretics, conjoined with the solution of the acetate of ammonia and spirit of nitric ether, or with nitrate of potash, will generally be of service, even although they may fail of materially promoting the functions in question. But, in other states of the malady,

diaphoretics of a warm and restorative nature, or a combination of the more common diaphoretics with stimulants and antispasmodics, as with ammonia, the ether, &c., especially after the tepid or warm bath has been resorted to, will be found most beneficial.

133. *Diuretics* should be given in similar combinations to those now advised, in the asthenic or malignant form of scarlatina; but in this form, and in the advanced stages more especially, the most certain diuretic is the spirit of turpentine administered in an enema, or the terebinthinate epithem or embrocation applied over the loins, as already mentioned. During desquamation, when the kidneys are frequently congested or the tubuli obstructed by the desquamated epithelium, the supertartrate of potash and bichlorate of soda, or the acetate or citrate of potash with either the acid or the alkaline carbonate in excess, or any of the saline diuretics, or others mentioned in the article DROPSY (§ 135, *et seq.*), when describing the treatment of *anasarca*, will be appropriate.

134. (g) Besides the above, *various means* have been recommended by writers, in the treatment of scarlatina, as either empirical remedies or as antiseptics and stimulants. The most serviceable of these, when judiciously employed, are the mineral acids, the alkalies, and certain vegetable acids and products. Of the *mineral acids*, the most beneficial are the hydrochloric and the nitro-hydrochloric, either in simple dilution, or conjoined with the decoction or infusion of cinchona, or with camphor, or with these and the hydrochloric ether. Of the vegetable acids, the *acetic* and the *citric* are the most useful. The former has been frequently employed both internally and externally, since the earliest irruptions of the malady in an epidemic form, chiefly on account of its antiseptic property; and with reference to this virtue I have often employed it; but more recently I have preferred the *pyroligneous acetic acid*, either combined as above, or given with creasote or other antiseptic agents, in the more malignant states of the disease. *Citric acid* is also beneficial in similar circumstances; but while I have considered it as preferable to the common acetic acid, I have believed it inferior to the pyroligneous. Either of these acids is often beneficial; but the vegetable acids now recommended should be given more liberally than they usually are.

135. *Chlorine* and the *chlorides* are also very excellent remedies in the more malignant states and advanced stages of scarlatina, their influence being aided by other restorative means, as cinchona, serpentaria, camphor, musk, capsicum, &c. *Chlorine* was first prescribed by BRAITHWAITE; and its excellent effects in the more malignant states of the disease have been acknowledged by many British and foreign authorities. The *chlorine-water* of the Dublin Pharmacopœia may be given in doses suitable to the age of the patient, in camphor mixture, or in any other proper vehicle. *Alkaline carbonates*, both the volatile and the fixed, have been recommended by many authorities in scarlatina. They may be prescribed with the remedies just named, and in the states of the disease, and in the combinations mentioned above (§ 108). *Nitrate of potash*, in full and frequent doses, has been advised by FRUNK; and it is

often of service when associated with other means which are appropriate to the peculiarities of the case, more especially with camphor and others already noticed. The use of *colchicum* has recently been recommended; but it is a hazardous agent even in the more sthenic forms of the malady, as its injurious operation is liable to be confounded with the unfavourable course of the disease. It should be given only in similar states and circumstances of the case to those for which I have admitted that the tartrate of antimony may be prescribed.

136. (*h*) *Gargles*, or, preferable to these, stimulating *lotions* or *washes*, with a strong solution of the *nitrate of silver*, or of powdered *alum* in the pyroligneous acid, are often extremely beneficial, when employed early in the anginous form of the malady, especially when the affection of the throat assumes an asthenic, malignant, or offensive character. Either of these solutions, or others already mentioned (§ 109), should be applied early by means of a camel's-hair brush, or of sponge, in the manner already pointed out; and the solution should be strong in proportion to the malignancy of the affection. At the same time as these means are being used, the external applications to the throat, about to be noticed (§ 140), should be resorted to, and the tonic, restorative, and antiseptic medicines mentioned above ought to be administered. A strong solution of the *bichloride of mercury* has been recommended by Dr. SAUTER to be used as a gargle in the more asthenic affection of the throat; and, judging from my experience of it as a gargle in analogous affections of this part, it is very likely to prove of service. In some of the more prolonged cases, and when the tonsils are much enlarged, I have directed the parts to be pencilled with the *tincture of iodine*, and if there be, as often observed, much external swelling after the eruption has disappeared, I have prescribed the same application externally. In less malignant cases, the chloro-sodaic solution of LABARRAQUE, in the proportion of an ounce to five of camphor water and half an ounce of honey, is a very useful gargle; or the decoction of *contrayerva* with hydrochloric acid and tincture of capsicum; or a filtered solution of the confection of roses with the same acid and tincture, or the tincture of myrrh, and camphorated spirit, may be employed in still less severe forms of the disease.

137. (*i*) *Cold*, in various modes of application, has been resorted to for the removal of the pungent heat of the surface, which is believed to increase not only the distress of the patient, but also the vascular action and the exhaustion of organic nervous power. It may always be safely applied when the skin is very hot and dry. Various modes of employing it have been advised. BEDDOES directed a free current of *cold air* to pass over the patient. But in resorting to this mode of reducing the temperature of the surface, the respiratory passages and organs may suffer, and the complications described above, especially bronchitis, pneumonia, pleuritis, or peritonitis, may thereby be occasioned; or the eruption may be suppressed. The obvious benefit resulting from treating the patient in a large, airy apartment, where the temperature is cool rather than very cold, and in which the air is being continually

renewed, should never be overlooked; and the bed and bed-clothing ought to be cool and light, especially during the eruptive stages; but subsequently both the one and the other ought to be so regulated as to favour the restoration of the cutaneous functions, and to equalize the due distribution of the blood.

138. The *affusion of cold water* over the surface of patients in scarlatina, so strenuously advised by Dr. CURRIE, and so generally and indiscriminately practiced during the commencement of this century, has been found beneficial early in the more sthenic and regular forms of the disease. But an injudicious recourse to this practice in asthenic, malignant, and complicated cases has brought it into disrepute. In the hands, however, of a discriminating physician—of one capable of interpreting aright existing pathological states, and of selecting and applying judiciously medicinal agents for the removal of these states—the cold affusion is still deserving of estimation. I have, however, preferred in most circumstances *cold* or *tepid sponging* of the surface, adapting the temperature, and the fluids employed, to the peculiarities of the case—*cold* or *cool fluids* at an early stage and in sthenic cases, and *tepid*, or even *warm fluids*, at an advanced period, and in the asthenic or malignant forms, whenever the skin is hot and dry. These are in many respects preferable to affusion, for they may be more frequently resorted to, and may be employed for a longer time, without exhausting the patient. The fluids which may be selected for this purpose deserve some notice. I have usually directed equal parts of vinegar and water, or of spirit of Mindereri and water, or camphor water, during the early stages; but have subsequently employed a weak alkaline solution, or a solution of borax, as being more likely to facilitate the restoration of the functions of the skin during the advanced stages, and to prevent the affection of the kidneys and the dropsy often supervening as sequelæ of the disease. Frequent sponging of the surface with a solution of the *nitro-hydrochloric acids*, of a *tepid* or *warm* temperature, according to the state of the case, will be found of much service in the malignant and asthenic forms of the malady.

139. (*i*) *Baths, tepid* or *warm*, according to the period of the disease and the peculiarities of the case, are often beneficial. The *tepid bath*, in the earlier stages, generally lowers the heat of the skin, mitigates the uneasiness and burning attending the eruption, and relaxes the surface. When the disease is farther advanced, especially if it be complicated, then the *warm bath* may be preferred; and when the eruption has suddenly or prematurely disappeared, salt and mustard may be added to the water. If a warm bath be required during desquamation, or if any of the sequelæ of the disease supervene, the alkaline sub-carbonates, or the bihydrate of soda, will be a very useful addition; and if the complication be of a very serious character, mustard may be added. A frequent recourse to warm baths, during desquamation, will generally prevent the sequelæ of scarlatina, especially if the alkaline additions just mentioned be made to the baths.

140. (*k*) *Embrocations* and *external applications* of various kinds have been employed; but they

are required chiefly for the severer states, and internal complications of the malady; or when the eruption either does not come out, or prematurely disappears. *Blisters* are most hazardous applications for children in this disease, and are generally so in proportion to their youth.* In the mild and regular forms they are not required, and in the malignant or complicated may produce gangrene of the part. They are sometimes of service in adults, especially at an advanced stage, and when due reference is made to the state of the urine. *Mustard poultices* are often of use in the circumstances just mentioned; but in the more malignant type of the disease, in very young subjects, they may be followed by effects almost as dangerous as those produced by blisters, if they be too long or injudiciously applied. The *embrocations* and *epithems* prescribed above (101) and in the APPENDIX (FORM. 295, 296, 307, 311) are the most efficacious, and are attended by none of the risks and ill effects often produced by blisters, and other external derivatives and counter-irritants. When properly employed, especially soon after a warm or tepid bath, they powerfully promote the functions of the skin; and, by the absorption of their fumes, chiefly by the lungs, they tend to restore the secreting and excreting functions generally. The application of these, in the several states of the disease, has been pointed out in the remarks already offered.

141. (1) The diet and regimen of the patient must depend, in some measure, upon the type and the stage of the disease, upon the peculiarities of the case, and the circumstances of the patient. In the more regular, sthenic, or inflammatory forms, and in the more complicated cases, especially if the complications occur at an early stage, the diet and regimen should be antiphlogistic. Barley-water, thin water-gruel, &c., are generally sufficient during the earlier periods; but afterward, and from the commencement in the more asthenic or malignant types, Seltzer or soda water with milk may be given; and as the disease proceeds, or begins to assume putro-adyynamic or malignant characters, spruce-beer, soda-water, or Seltzer-water with wine; sago, arrow-root, or tapioca with wine, or even with brandy in some cases, may likewise be prescribed; beef-tea, chicken or other broths being also allowed, according to circumstances. Due ventilation should always be insisted on, avoiding, however, currents of air, especially during desquamation; the bed and bed-clothes being regulated according to the type, character, and stage of the disease, as above advised (§ 97, et *pluries*). In order to prevent the usual sequelæ of the disease, during desquamation and recovery, the diet and regimen of these periods ought to be strictly prescribed, conformably with the advice already given (§ 120-123); and if *anæmia* or much *debility* be observed, the treatment prescribed for these, in the places referred to, should be adopted. (See *arts. Blood, Deficiency of* (§ 48), and *Debility* (§ 35, et *seq.*).

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* [Blisters should never be employed in this disease under any circumstances.]

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SCIRRHUS AND OTHER MORBID GROWTHS.—SYNON.—*Squithrus* (σκιρπος,

hard), *Scirrhomia*, *Scirrhorosis*, *Carcinos*, *Induratio maligna*; *Cancer scirrhusos*, *C. fibrosum*; *Carcinoma*, Celsus. *Encephaloma*; *Scirrhom-fungus*; *Scirrhom-encephaloid*; *Scirrhom-encephaloma*; *Scirrhom-cancer*; *Scirrhom-colloid*; *Colloid*, *Colloid tissue*, of recent writers. *Kapke vog*, Hippocrates, Galen. *Skirrhos*, *Carkinoma*, Swediaur. *Carcinus*, Good. *Krebs*, *Krebs-schaden*, *Skirrus*, Germ. *Scirrhe*, *Carcinome*, Fr. *Scirrho*, Ital.

SCIRRHIOUS AND OTHER TUMOURS.—*Adventitious Growths*.—*Malignant and Non-malignant Tumours*.—*Cancerous and Non-cancerous Formations*.—*Cancer and Canceroid Growths*, J. H. Bennett.

CLASSIF.—*See* CANCER and FUNGOID DISEASE.

1. DEFIN. — SCIRRHIO-CANCER. — *A morbid growth or structure possessed of the power of extending itself, or of redevelopment after removal, and arising from constitutional vice.*

2. NON-MALIGNANT GROWTHS. — *Structures which are adventitious, and possess the power of extending themselves locally, but which do not return after removal, nor contaminate the constitution.*

3. Professor BENNETT has defined true cancerous growths to consist of a structure which, "once existing, may spread to other tissues or organs, causing in them a disease or growth similar to itself, by a species of propagation similar to that possessed by animalcules or vegetable fungi." In the articles in this work devoted to the consideration of the chief forms of CANCER, *scirrhus* has been treated of in its principal pathological and therapeutical relations (*see arts.* CANCER, DISEASE, § 141, 142, and FUNGOID, or FUNGO-HÆMATOID DISEASE.) Since these were published, the researches of several eminent British and foreign physicians have appeared, and have added considerably to our knowledge of the intimate structure of cancerous growths, into which the scirrhus conformation enters more or less, and upon which the other forms of cancer often supervene or are ingrafted. Most of the recent writers on cancerous formations have described the microscopic appearances of these formations; but they rarely agree as to what really constitutes the cancerous elements of structure; and hence they contribute comparatively little to the diagnosis between truly cancerous and non-cancerous growths, and that little is neither generally nor readily applicable in practice; while it in other respects does not tend to the advancement of practical knowledge. The purely practical physician, however scientific and rational his acquirements, may, perhaps, value the researches of the "*Histologists*"—as the microscopic observers, conformably with Germanic custom, denominate themselves—at too low an estimate; but there is little risk of any of them falling into this error, however they may fail in adding to our knowledge of the causation, prevention, or removal of the diseases which they microscopically investigate. Nevertheless, the information which they furnish ought not to be neglected, but should stimulate others, by its very deficiencies—by showing how little is really obtained by carrying us a step or two forward in our analysis—by comparing numerous discrepancies, opposite views, apparent differen-

ces, contradictory assertions, &c.—to attain greater precision of observation and description, unbiased by hypothesis or hastily-formed opinion.

4. All the forms of cancer were, up to an early period of the present century, limited to, 1st. Scirrhom-cancer and Carcinoma; and, 2d. To Fungus Hæmatodes, or Hæmato-fungoid disease. To these were successively added, 3d. Encephaloma; 4th. Colloid disease; and, 5th. Melanosis. Encephaloma, or encephaloid tissue, and hæmato-fungoid disease, are evidently identical, the former being a more remarkable development of the brain or milt-like production than the latter, which presents, with more or less of this production, a much more remarkable state of abnormal vascular development. Colloid formation has greater claims to the rank of a variety of scirrhom-cancer, although it is often associated with, or approximates to, the scirrhus structure. Melanosis should be viewed as a distinct formation, and not more intimately connected with true cancer than are tubercles. Among the earliest investigators of the microscopic structure of scirrhom-cancer, MÜLLER is most deserving of mention. In his work he divides scirrhom-canceroid growths into the following varieties: 1st. Carcinoma fibrosum seu simplex; 2d. Carcinoma reticulare; 3d. Carcinoma alveolare; 4th. Carcinoma melanodes; 5th. Carcinoma medullare; 6th. Carcinoma hyalinum seu fasciculatum. VOGEL reduced the varieties to four: 1st. Cellular cancer; 2d. Fibrous cancer; 3d. Melanotic cancer; and, 4th. Colloid cancer. GLUGE distinguishes only three forms: 1st. Fungus medullaris; 2d. Scirrhus; and, 3d. Cancerous ulcer. Dr. WALSH, and, more recently, Professor BENNETT, consider that there are only three forms of cancer, properly so called, viz.: (a) Scirrhus, or hard; (b) Encephaloma, or soft; and, (c) Colloid or jelly-like cancer. All the forms mentioned by morbid anatomists may, they think, be readily comprised under one or other of these heads.

5. Professor BENNETT remarks, that "when we endeavour to define what a cancerous growth really is, according to the description of morbid anatomists, or the symptoms of medical practitioners, we are at once thrown into a crowd of inconsistencies, from which the sooner we emancipate ourselves the better. This can be only done by attaching the term cancer to some characteristic structure. LEBERT has endeavoured to do this, and to establish that the existence of the *cancer-cell* is pathognomonic; that it may be distinguished from every other kind of cell formation, and at once indicates the nature of a cancerous growth." But Dr. BENNETT adds, that the numerous observations which he has made obliges him to differ from M. LEBERT, and rather to agree with MÜLLER in thinking that no single element is diagnostic of scirrhom-cancer. The circumstance that no individual element is characteristic of cancer led MÜLLER to maintain that there is no histological difference between it and healthy textures. This also induced VIRCHOW to coincide with him in the opinion that "carcinoma is no heterologous tissue, and its finer parts are not essentially different from the tissues of benignant textures and the primitive tissues of the embryo." If this be true,

much indeed, nearly all that I have to add under this head to what I have already written on scirrhus-cancer or malignant growths, may be spared; and I might join Dr. WATSON in remarking that "microscopic observers say that, in their minute and original structure, there is no perceptible distinction between the most innocent and the most malignant growths; nay, that both agree in their primary corpuscular elements with the healthy tissues of animals and even of plants. This very agreement, if it really be so complete, shows that in *classifying* morbid growths, we must reject the aid of the microscope, and attend to their proper and more palpable features."—(*Princip. and Pract. of Physic*, 3d edit., vol. i., p. 217.)

6. But the "Histologists" aver that the microscope alone can furnish the diagnosis and the basis of classification, and it alone; and as they include in their ranks illustrious names, notwithstanding equally illustrious dissentients, it is due to them to hear their statements and weigh their arguments. Professor BENNETT observes, that "this dispute as to whether a cancerous growth be heterologous or homologous (LAENNEC), heteromorphous or homomorphous (LEBERT), arises from two modes of viewing the subject. If any one individual element be chosen as the test of comparison, then it does not essentially differ from others existing in healthy tissues, and the structure is *not* heterologous; but if several be chosen, and their relation to each other studied, then they differ from those in normal textures, and they *are* heterologous." (*Op. cit.*, p. 171.) VOGEL says, that "our diagnosis must be based not so much on the coarser physical characters, which in cancer are liable to extreme variations, as on the histological relations as viewed through the microscope." Before, however, the consideration of the distinctions which histologists believe may be drawn by means of the more powerful microscopes, it will be necessary, in the *first place*, to take a view of the *elements* assigned by them as entering into the structure of scirrhus-cancer and morbid growths. According to Professor BENNETT, the latest writer on morbid structures of a scirrhus-cancerous and cancrioid nature, the following elementary forms enter into their composition: 1st. Molecules and granules; 2d. Naked nuclei; 3d. Cells of various kinds; 4th. Filaments or fibres; 5th. Blood-vessels; 6th. Crystals. These he considers as the elements of all morbid products. And agreeably with his own researches and with those of several other observers, he states that there is not any thing characteristic of cancer in either of these elements when viewed alone; and that it is only in relation to each other that they become important. In this article I shall consider the elementary structure of both SCIRRHO-CANCEROUS and CANCROID GROWTHS—of both MALIGNANT and NON-MALIGNANT TUMOURS; and shall follow the arrangement and researches of Professor BENNETT.

7. I. ELEMENTS OF MORBID GROWTHS.—I. MOLECULES AND GRANULES are described by Dr. BENNETT as varieties of the same form. A *molecule* he defines to be a minute body presenting no determinate edge or internal centre; a *granule*, a body which varies in size, and is distinguished by a distinct margin, the external edge of which is abrupt. When transparent,

granules refract light and present a bright or dark centre, according to the focal point in which they are viewed. A molecule may become a granule under a greater magnifying power, and the latter appears as the former under a less power; so that there is actually no real distinction between these two organic elements. These bodies seem to vary in composition. They may consist of various kinds of fat, and disappear on the addition of potash or ether; or they may be albuminous, and be partly dissolved by acetic acid; or partly fatty and partly albuminous; or they may consist of pigmentary or mineral matter. A granule may be so large as to be called a globule; such as the bodies found in milk. Molecules and granules differ in shape; in general they are spherical, but they are sometimes more or less angular; they may be isolated, or grouped, forming granular masses; they may exist alone, or be mixed with other elementary forms. Dr. BENNETT considers them the most universal element in tissues, and of the greatest importance in their indications of the nature of structure.

8. These bodies appear to be formed *primarily* by precipitation, and *secondarily* by disintegration. The *primary* change in the germinating seed or ovum is the gradual appearance, in a transparent fluid, of numerous molecules and granules, which, by coalescing or enlarging, are gradually changed into more compound structures. The *secondary* formation is when a structure decays, and gradually breaks down into an organic or animal debris; this is resolved into granules and molecules, which are ultimately reduced to a fluid state and are absorbed. Thus there may be granules of evolution and granules of disintegration.—(BENNETT.) Molecules and granules have distinct movements of their own; they turn round in a liquid with a tremulous movement. In the interior of cells these movements are often well marked, and very regular. "When we magnify a salivary globule 600 or 800 diameters linear, we can see minute granular contents in a state of continual vibration, or revolving in circles of extreme minuteness. In certain vegetable cells these circles are enlarged so as to constitute a visible circulation. We frequently find molecules and granules encrusting or attached to larger globules, and they, doubtless, occasionally serve to assist the progress of development. Sometimes they are attached together in masses, at others repelled and kept isolated. Similar facts may be observed wherever minute solid particles are seen floating in fluids, which prove that the movements of the minutest molecules are governed by laws as definite and fixed as those which rule the planets revolving in space.

9. "Molecules and granules may be produced mechanically, and are thus capable of being subjected to the same laws as those which are formed naturally. Thus, the pigmentary and mineral granules precipitated by the chemist are identical with those precipitated in living fluids. Again, when transparent oil and transparent albumen are brought into contact, a precipitation in a membranous form takes place at the point of union. Thus, a drop of oil cannot for a moment be surrounded by an albuminous fluid, without its being included in a vesicular membrane or cell. Rubbing the two drops of

oil and albumen together resolves them into granules composed of a minute particle of the one surrounded by a thin film of the other, which granules are identical with those found in animal fluids. Now, when it is remembered that oil and albumen pervade all organized bodies, that they are continually coming in contact, and that membranes and cells must thereby be necessarily produced; moreover, as the other soluble elements which enter into organized structures must communicate to the fluids various kinds of densities, it will be clear that all the physical conditions necessary for endosmosis and exosmosis must be present. When, in addition, it is considered that modern anatomy and physiology have demonstrated that all organized structures consist of granules, nuclei, and cells, composed, in like manner, of a membranous envelope, and endowed more or less with the same physical properties, the importance of these facts must be recognised" (p. 140, 141).

10. Professor BENNETT considers it in the highest degree probable that all blastemata (*blastema* or *cytoblastema*, or the *amorphous plasma*, which gives origin to cells or organized formations; see art. PUS, § 2), containing the necessary nutritive principles in solution, precipitate minute oily particles, which are the elementary granules of histologists. These, either separately or united, constitute nuclei composed of oil, surrounded by an albuminous membrane. In this condition they become subject to the physical law of endosmosis and exosmosis, and absorb or exude materials, according to the circumstances in which they are placed, and the unknown vital power to which they are subjected. "It must always be remembered that the granules produced mechanically by the union of oil and albumen, are not vital structures; but when formed in the animal body, under certain conditions, they become so. The physical relations pointed out are only necessary preliminary steps for the addition of that unknown force we call vitality, which directs the ultimate form these structures assume. They are a *sine qua non*, without which vitality cannot be called into existence. The different cells entering into the composition of the tissues are not formed from them directly, as ASCHERSON supposed, but are the result of a series of physical and vital changes occurring in the elementary granules and nuclei, which, however, are themselves produced in the manner he pointed out" (p. 141, 142). Instead, however, of saying that the physical conditions or relations here adverted to "are a *sine qua non* without which vitality cannot be called into existence," it would be more correct to say, that they are the simplest and the earliest material or physical entities with which vitality is allied, and that, with the agency, or under the influence of this alliance, they are capable of passing through a series of changes of a more and more complex kind; that, although vitality could not be manifested without such material entities or alliances, in their earliest as well as in their progressively advanced states, the development and preservation of these states are entirely owing to the vitality with which such material entities are endowed from their earliest periods, and in their simplest forms, of existence. Dr. BENNETT concludes, that the

above considerations lead to a generalization that is of some importance, namely, that the molecular element is the real basis of all the tissues, and not the cell, as maintained by SCHWANN, or the nucleus, as is contended for by HENLE; for no cells are formed without nuclei, and no nuclei without granules; and it is a knowledge of the laws regulating the deposition of the latter in exudation, and within nuclei and cells, that must guide us to a rational therapeutics, so far as the diseases of nutrition are concerned.

11. ii. NAKED NUCLEI.—Nuclei may be formed, according to Professor BENNETT, *primarily* and *secondarily*. 1st. By the aggregation or confluence of molecules and granules, upon which a cell-wall is afterward formed, "during the transformations of which the nucleus may remain permanently, may undergo a species of development, or completely disappear." 2d. The original nucleus may expand and form the outer cell-wall, and another nucleus may be produced within it, also by the deposition and confluence of granules, which, by division, or the formation of other internal nucleoli, produce new nuclei and cells. "In either of these cases, occurring in healthy or morbid tissues, we may observe the nuclei of cells in all stages of their growth, and can have little doubt as to the progressive steps of their production." Dr. BENNETT considers that the nuclei formed in scirrho-cancerous and canceroid growths are produced in the same way as similar bodies in other textures; and that, when seen in well-formed cancer-cells, they are for the most part secondary; that is, formed subsequently to the cell-wall which incloses them. He has, however, often found numerous naked nuclei mingled with the fibrous stroma. In some of these, doubtless, their occurrence is explained by the breaking down and disappearance of the cell-walls, which at one time inclosed them. In this manner *free nuclei* occur secondarily, and are the result of disintegration; but at other times they are undoubtedly a primary formation, existing in an advancing, and not in a retrogressive growth, and are then often unconnected with cells. Whether free nuclei are ever capable of producing similar bodies, as BRICH believes, without the agency of cells, is very doubtful. But Dr. BENNETT considers them in no way necessarily connected with cancerous growths. In some instances they are associated with fusiform corpuscles, and are observed either to be identical in form and appearance with their nuclei, or as elongating to constitute that corpuscle itself—a transformation rendered very probable by their appearances in several cases. "The true signification of these free nuclei is in some instances difficult to determine; for while we may occasionally, with M. LEBERT, consider them as fibroplastic, in progress of development into fibres, and at other times the remains of broken-down cells, the result of disintegration, there are other instances where the growth is advancing, and where there are no evidences to warrant either of these explanations." If they be connected with the fibrous element, it is easy to conceive that any of them remaining in a tissue may cause the return of a swelling in the cicatrix, or in the situation of a former tumour. But Dr. BENNETT is unacquainted with any fact

which proves that a growth consisting of great multitudes of free nuclei among the fibrous stroma ever possesses the power of spreading to other tissues, as is the case with cancer. "It is therefore probable, that as granules, which are in many respects identical, may be transformed into the nuclei of different textures; so nuclei which are alike may be connected with fibres, or with various kinds of cells. Of the laws regulating these transformations we are ignorant; but as there are no granules distinctive of cancer-nucleoli, so there are no nuclei distinctive of cancer-cells. Moreover, the observations alluded to show the necessity of considering nuclei as bodies distinct from cells. They may occur alone with fibres, producing a texture which may be called fibro-nucleated." KÖLLIKER and HENLE have described the occurrence of diaphanous bodies floating among various tissues. Dr. BENNETT has frequently seen these not only in cancerous and canceroid growths, but also in a variety of morbid products, and in the fluid squeezed from the lungs in catarrh and from other œdematous tissues. He thinks that they may present a certain stage in the development of the nucleus, but that they are more probably nuclei enlarged by the endosmosis of fluid, a view which is favoured by the fact of their frequency in textures which are softened or infiltrated with serum.

12. *iii. CELLS.*—Professor BENNETT states that there is no kind of cell-formation which, at all times and under all circumstances, is capable of being distinguished from every other form of cell-growth. Nevertheless, very characteristic differences may exist among cells, the study of which is of the greatest service in distinguishing one tissue from another. These differences principally depend upon the age or state of development, the situation in which the cells are formed, and a variety of concomitant circumstances, all of which should be taken into account before an accurate opinion as to their nature can be formed. The different kinds of cell which Dr. BENNETT has observed in scirrho-cancerous and canceroid growths are, 1st. The cancer-cell; 2d. Epithelial-cell; 3d. Cartilage-cell; 4th. Compound granular-cell; 5th. Fibro-plastic and fusiform-cell; 6th. Pus-cell. These names he admits to be open to objection, but he has none other to substitute for them. One viewed by itself is often not to be distinguished from another. It is only when occurring in groups, or examined in relation to surrounding textures, that these terms become significant. An exact appreciation of each is of the utmost importance in the microscopic study of morbid growths.

13. *A. Cancer-cell.*—Dr. BENNETT's description of this cell is the most elaborate. He states that it exists under numerous forms, presents very different appearances at different times, and is of variable size. In form it is either round, oval, caudate, spindle-shaped, oblong, square, heart-shaped, or of various forms, from pressure on its sides. The external edge is generally sharp and well-defined on the field of the microscope. It varies in size from the 1-100th to the 1-10th of a millimetre in diameter; the former size occurring in a very early stage of its development, the latter when the cell is old, and contains other cells. It is most com-

monly 1-50th to 1-30th of a millimetre in diameter. The cell is destitute of colour, except in melanotic cancer, when the pigment-granules it contains tinge it of a light or dark bistre brown, passing into deep black. The cell-wall, when young, is smooth and distended; when old, it is more or less corrugated and flaccid. Its contents are various. There is always one nucleus, often two, and sometimes from three to nine. Most frequently there is only one, which is round or oval, generally the latter, and contains one or two granules or nucleoli. The nucleus, like the cell itself, varies in size, and may occupy from 1-6th to 4-5ths of its volume. Between the nucleus and cell-wall there is a colourless liquid, which, at first transparent, becomes afterward opalescent, from the presence of molecules and granules. On the addition of water, the cell-wall becomes distended by endosmosis, and is enlarged. Sirup and thick mucilage cause it to shrink and contract by exosmosis. The addition of acetic acid renders the cell-wall more transparent, and dissolves the young cells; while the nucleus either is unaffected, or its margin becomes thicker, and its substance more contracted. Liquor potassæ reduces the whole to an amorphous mass.

14. The mode in which the cancer-cell is developed offers, in the opinion of Dr. BENNETT, one of the best examples of the endogenous growth and multiplication of cell within cell. At first, numerous molecules and granules are formed in the semifluid or solid blastema, several of them coalescing to constitute a nucleus, which assumes an oval or round form. On this a cell-wall arises, and gradually enlarges, apparently formed either by the confluence of molecules attracted to the nucleus, or by the expansion of the nuclear wall. In either case, the cell-wall enlarges and separates itself from the nucleus by the endosmosis or assimilation of fluid from the surrounding blastema. Another nucleus may now often be observed arising within the cell-wall, first assuming the form of a granule, which gradually enlarges until it presents the same form and size as the former one. Double nucleated cells are very common. Within each nucleus may now also be seen one or two nucleoli, which sometimes form very early, and hold the same relation to the nucleus as the nucleus does to the cell. One or both nuclei now enlarge: the nucleoli also increase in size, and not infrequently within these latter other granules may be seen, forming and enlarging in their turn. "As the included nuclei grow and become transformed into cells, the original cell-wall becomes gradually atrophied, and dissolves or breaks down into granules of disintegration; but in cases where the growth is rapid it expands, and constitutes what has been called a mother-cell, within which several cells, nuclei and nucleoli, may be seen in various stages of development. More commonly they dissolve or break down before arriving at this, and their progress is often checked by the formation between the nucleus and cell-wall of numerous fatty molecules and granules, which at length fill up the cell, press upon the nucleus, and render it abortive." This constitutes one of the modes in which the so-called compound granular cell is produced.

15. As the cell-wall becomes older, it seems to thicken, and to be less readily affected by re-

agents VOGEL says that the thick cell wall may assume a fibrous character. Dr. BENNETT has never seen this, nor any appearance of cancer-cells being developed into fibres. These cells may become caudate, elongated, and throw out pointed prolongations, but they do not split up into filaments. It is probable that fusiform or epithelial cells have been mistaken for them. Nor does Dr. BENNETT agree with KÜSS in supposing that the mother-cells may split into smaller segments, and so multiply by division. It is probable that cells impacted in masses of coagulated blastema have been mistaken for compound cells, owing to their close resemblance. BRUCH considers that secondary cells form within the parent one not only endogenously, but by the division of the nucleus; and supports this opinion by numerous known facts in the development of embryonal cells and of plants, in which the nucleus is seen dividing in various ways; but he denies that the cell-wall itself ever thus divides.

16. The *cause* of the cancer-cell varying in size, appearance, and structure, according to Dr. BENNETT, is the arrest of the process of development at different stages. It is, he supposes, with a simple cell as with the most highly organized plant or animal. It may perish at birth, infancy, youth, or maturity, while comparatively few arrive at old age. The situation and the amount of exudation or blastema thrown out also influence their number, form, and size; while the degree of pressure to which they are subjected produces a similar result.

17. Is the cancer-cell a *new substance*, or is it only a modification of cells pre-existing in the body? Dr. BENNETT states that, examined by itself, there is no possibility of distinguishing a cancer-cell from many epithelial, cartilage, or embryonal cells. "When, therefore, a cancerous growth involves a mucous membrane, the skin or bone, it may be maintained that the cells contained in it are only excessive multiplications of normal structures. When the universality of mucous membranes is considered, how they line all hollow viscera, and permeate the various glands in which cancer is common, the difficulty of disproving such a view becomes very great." In the liver, also, the hepatic cells may be confounded with those of cancer in certain stages of their development; and it may be asked whether, in this situation, the morbid cells are not altered normal ones. This question, then, can only be solved by paying attention to a series of observations; and Dr. BENNETT thinks that those which he has detailed are sufficiently numerous and varied to prove the following: 1st. That the cancerous originates in the same nervous and vascular disturbances as the other forms of exudation. 2d. That cancer-cells, in whatever tissue they may be found, whether glandular, areolar, osseous, &c., present the same characters; and, 3d. That cancer may be actually seen to arise in tissues altogether separate from epithelium or cartilage. "It may be doubted whether the true cancer-cell be ever formed by transformation of a previously existing one. On the other hand, the epithelial and cartilage cell may assume all the characters of that found in cancer, but a detection of their normal or anormal origin constitutes one of the distinctions between cancerous and canceroid growths."—(*Op.*

cit., p. 149.) It is manifest from the foregoing that "Histology" throws but a faint light upon the diagnosis of the several forms of scirrhus-cancer. But it may be interesting to know what one of the ablest and most zealous histologists farther states respecting other cells found in morbid and healthy structures.

18. *B. Epithelial-cells.*—The different forms of epithelial or epidermic cells, and the mode of their formation, appear to be much the same in morbid as in healthy tissues. Dr. BENNETT states that young plastic epithelial-cells, when isolated and viewed by themselves, present all the physical characters of cancer-cells, especially when they have been lying for some time in a fluid, as often observed in the air vesicles of the lungs, in the ventricles of the brain, or in the mucous coat of the bladder. When studied, however, in mass, nothing can be more easy than to distinguish them. They have a disposition to run together in groups, and to adhere at their edges; they are of tolerably uniform size. Cancer-cells, on the other hand, never exhibit a tendency to coalesce, but are for the most part separated by a greater or less quantity of molecular and granular matter, either disintegrated, or aggregated together: they vary greatly in size. As epithelial-cells become older, their dissimilarity from cancer-cells becomes greater; they are then flatter, and resemble scales. They are also more opaque, and more resistant to the action of acetic acid. When epithelial-cells constitute the principal portion of a morbid growth, such as corns, warts, scaly eruptions, &c., they become greatly compressed together, those external presenting a series of superimposed laminae, while the deeper are round, oval, spindle-shaped, or more or less altered in form, or sometimes united into a firm growth, by pressure. "Occasionally such growths soften and ulcerate at their summit, especially on mucous membranes, when the superficial cells imbibe moisture, enlarge, and occasionally again present many of the characters of cancer-cells."

19. *C. Cartilage-cell.*—Dr. BENNETT states, that many young cartilage-cells present the physical characters of cancer-cells, and are similarly developed, so that at an advanced stage they resemble, with their included cells and nuclei, mother cancer-cells. They may, however, be distinguished in healthy adult articular cartilage, by the hyaline solid blastema in which they are imbedded, and by the great distinctness of their margins and the high refractive power of their nuclei. Even in diseased states of articular cartilages, the cells of this structure may be distinguished from cancer-cells, by the presence of some of the former in a healthy state, although the majority of them become more or less opaque, from the deposition of molecular matter, and from the cells becoming partly or wholly filled with fatty granules.

20. The cells in *morbid cartilaginous growths* are large, and, according to MÜLLER, more resemble those of the embryonal than of the adult tissues. These cells, when they become separated by disintegration of the hyaline substance, as observed in softened enchondromatous growth, pass more or less from the normal type, and resemble cancer-cells. In these cases the solid hyaline blastema breaks down

into a molecular fluid, the cells are liberated, become enlarged, and float in it, together with broken up fragments of the fibrous structure, should any have existed. Water and acetic acid produce different effects upon these from those occasioned on cancer-cells.

21. *D. Fibro-plastic and Fusiform Cell.*—M. LEBERT describes under this term a peculiar round or oval corpuscle, with a small nucleus, which has a tendency to elongate at both extremities, and to be transformed into fibres. Dr. BENNETT has met with these in all stages of their development, even in cancerous and canceroid growths; but very often also in tissues and under circumstances unconnected with cancer, as in gelatinous polypus, and in the coagulated exudation from inflamed serous surfaces. From this he concludes that fibro-plastic corpuscles are formed independently of all cancerous complication, and that cells so produced have the power, as stated by SCHWANN, of developing themselves into fibres. MÜLLER remarks, that "the caudate corpuscles are by no means peculiar to fungus medullaris: they may, indeed, often be observed in its substance, but they frequently do not exist in it, while they are as often met with in non-carcinomatous as in medullary growths." He adds, that they probably depend only on the transformation of cells into fibres, and are consequently merely fibres in an early stage of development. Both LEBERT and BENNETT conclude, that the round or oval fibro-plastic cell, by elongation on one or both sides, becomes caudate, spindle-shaped, and at length fusiform; and that "after a time, fusiform corpuscles, by being aggregated and compressed together, may produce a fibrous texture of considerable density, and, by subsequently splitting up into fibres, occasion a true filamentous or densely fibrous tissue." Dr. BENNETT adds, that the fibro-plastic cell may so resemble the young cancer and epithelial cell as not to be distinguished from either when viewed alone; but, by observing the form and character of the structures associated with it, and paying attention to the concomitant circumstances, it may in general be recognised.

22. *E. Compound Granular Cell.*—This cell is common in all morbid growths, and is frequently present in all the forms of cancer. It is round or oval, with a nucleus sometimes visible, at other times not. This cell varies from the 1-50th to the 1-35th of a millimetre in diameter, or even still more. It sometimes contains a few granules only, at others it is so completely filled with them as to assume a brownish or dark appearance. Water produces no change in this cell, but acetic acid sometimes renders the cell wall more transparent. Compound granular cells are soluble in ether, and break down into a molecular mass on the addition of potash and ammonia. On gradually pressing these cells by a compressor, large drops like those of oil, sometimes appear within the cell wall, or exude through it. The cell wall may be ruptured by friction, and its contents dispersed.

23. The development of these cells has been watched by Dr. BENNETT in all forms of morbid products, and especially in the softening occurring in nervous centres. There it may be observed that the exudation first coagulates in minute molecules and granules, among which

larger, colourless, transparent bodies are soon perceived. These are nuclei, upon which a cell wall arises. Granules, nuclei, and cells may frequently be seen in all their stages of development, coating or incrusting the vessels externally. The granules are generally formed in the cell, between the nucleus and its wall. These become more and more numerous, until at length the nucleus is observed, and the whole cell appears full and distended with them. The cell wall is now dissolved, and its contents escape. Conjoined with this cell, masses of granules are often seen cohering together, of various shapes, and not surrounded by any membrane. These masses sometimes arise from the solution of the cell wall, or consist of portions of the coagulated exudation, frequently seen to break, and peel off from the vessels. The cells and masses now described are found in the exudative softening of parenchymatous organs, on the surface of granulations and pyogenic membranes, in the colostrum, accompanying pus corpuscles, and combined with cancerous, tubercular, encysted, and all other kinds of morbid growths. They were first described by GLÜGE, who called them "inflammation globules." VOGEL termed them "granular cells;" and Dr. BENNETT first called them "exudation corpuscles;" but afterward "compound granular cells," as involving no theory.

24. The true nature of these cells has been variously viewed. They were long considered to indicate the existence of inflammation, and their presence in various kinds of exudation supported the opinion; but BENNETT states, that the recent researches of REINHARDT and VIRCHOW have shown that there is no form of cell growth which, under certain conditions, may not exhibit numerous fatty granules in its interior, and resemble the different stages of the compound granular cell. In this manner epithelial, cartilage, hepatic, pus, cancer, and indeed every other cell, may be transformed into the compound granular cell, by exactly the same series of changes as are above described. These observers consider that the frequency of this form of cell in so many kinds of morbid growth, and in such various textures and fluids, is not so much evidence of exudation as of the fatty degeneration of all cell formations; and they farther point out this fatty transformation as sometimes commencing in the nucleus, or even in the nucleolus when it is enlarged—a fact which explains many of the appearances observed in scirrho-cancerous and canceroid and other growths.

25. *F. Pus-cell.*—In the article Pus I have described the *Pus-cell*, according to VOGEL. Pus consists of numerous corpuscles floating in a clear fluid—*puris liquor*. These corpuscles are perfectly globular, and vary from 1-100th to 1-75th of a millimetre in diameter. Their surface is finely granular. They have a regular, defined edge, and roll freely in the liquor puris upon each other. The addition of water increases their size, their finely granulated surface disappears, and they become more transparent. Weak acetic acid partially, and the strong acetic acid completely dissolves the cell wall, and brings into view the nucleus, which assumes the appearance of two or three, or even four or five granules close together, each with a central shadowed spot, and generally

about 1-400th of a millimetre in diameter. Alkalies and ether completely dissolve the pus-corpuscle. Dr. BENNETT describes the production of the pus-cell as follows: The exudation first forms a molecular and granular blastema, the individual granules of which unite together in twos and threes, and constitute a nucleus, from which a cell wall arises. The early formation of pus may be observed in the matter squeezed out of unripe abscesses, and in the exudations from blisters and other inflamed surfaces. The cell wall thus formed is about 1-50th of a millimetre in diameter, is highly elastic, and assumes shapes according to the degree and direction of the pressure to which it is subjected. Water and acetic acid dissolve the cell wall, while the nucleus—which before the addition of these reagents resembled an ordinary pus-corpuscle—exhibits the usual two or three granules, which may be considered as nucleoli. Dr. BENNETT thinks that the bodies, which have hitherto been considered as pus-cells, are only the nuclei of corpuscles, the delicate walls of which are dissolved very rapidly and at an early period; but whether this is invariably the case requires to be confirmed.

26. *Pus* varies in its characters with the surface on which it is formed, and the stage and course of its formation—with its age and circumstances affecting it. When formed on a *mucous membrane*, it is often mingled with epithelial-cells in various stages of development. Some "*Histologists*" have talked of mucous corpuscles; but Dr. BENNETT very justly remarks, that there are no bodies peculiar to mucus, what have been described as mucous corpuscles being either epithelium or pus-cells. When formed on a *serous surface*, pus-cells are associated with filaments, and with corpuscles which differ from them in structure. These corpuscles, from the frequency of their occurrence in plastic lymph, Dr. BENNETT has called *plastic corpuscles*. VALENTIN and others have termed them *exudation corpuscles*; and M. LEBERT and Dr. WALSHE *pyoid*, from their resemblance to those of pus. They are composed of a distinct cell wall, inclosing from three to eight granules. They vary in size from the 1-100th to the 1-75th of a millimetre in diameter. The addition of water and acetic acid causes no change in them, although the latter reagent sometimes contracts and thickens the cell wall, and at others renders it more transparent. On some occasions, when the exudation is so abundant on a serous membrane as not to coagulate, and when the fibrinous and serous portions are not fully separated, the corpuscles assume the characters of those of pus, although some of the fibrous element, with plastic corpuscles adhering to them, may still be observed. Dr. BENNETT states, that *pus-cells* are occasionally found in the fluid on the surface of cancerous ulcerations; but that he has never met with them in softened cancer of internal organs but in one case, when they were at once distinguished by the action of acetic acid. This reagent, by exhibiting the peculiar granular nucleus—or nucleoli—of the pus-cell, at once distinguishes this cell from young cancer-cells (§ 14), from young epithelial-cells (§ 18), and from fibro-plastic cells (§ 21).

27. *iv. FILAMENTS AND FIBRES*.—Scirrhocancer, canceroid, and various other morbid growths have generally for their basis a fibrous struc-

ture more or less firm, which presents all the characters as to early formation and development of fibrous tissues in healthy structures. Professor BENNETT* states, that sometimes the fibrous tissue consists of delicate filaments of 1-600th of a millimetre in thickness; at other times of well-formed areolar tissue, the diameter of each filament varying from 1-500th to 1-400th of a millimetre in diameter. The addition of acetic acid often renders it more transparent, and presents visible permanent elongated nuclei. Such fibrous tissue is probably formed by the juxtaposition and ultimate development of the fusiform cells described above (§ 21). Occasionally the fibrous structure resembles elastic tissue, the filaments varying from 1-300th to 1-250th of a millimetre in diameter, and presents the characteristic curled appearance. These different kinds of filaments are sometimes so closely placed together as scarcely to be separated by the needle, at other times they are loose, widely separated, and easily torn. "They may run together, side by side, in wavy bands; be mingled together in an inextricable mesh-work; or arranged in the form of loops or circles, surrounding openings or loculi."

28. Fibrous tissue is said to be formed in three ways: 1st. By the precipitation in a fluid blastema of fibrous molecules, in the form of rows, which afterward coalesce and become consolidated into filaments. This process has been shown in the buffy coat of the blood and in recent exudation from serous surfaces. 2d. By the accumulation of granules, so as to form a spindle-shaped nucleus, which by its elongation splits up the coagulated exudation into laminae and fibres, as is observed in many forms of fibrous tissue. 3d. By the development of cells which become elongated at both ends so as to form a fusiform corpuscle, which ultimately splits up into filaments, as seen in chronic exudation on serous surfaces. All these modes of formation are seen in canceroid and other morbid growths.

29. *v. CRYSTALS*.—These are sometimes found in cancerous and other growths, especially if these growths have been kept any time or are partly decomposed, or if they occur on mucous surfaces. "They then assume the prismatic and other shapes of the triple phosphate, and are the results of putrefaction. Irregularly formed crystalline masses are present in the structures, which undergo a calcereous degeneration. Crystals of cholesterine are occasionally found in the reticulum of cancer, and sometimes needle-shaped crystals of margarine."—(*Op. cit.*, p. 160, 161.)

30. *vi. BLOOD-VESSELS*.—Dr. BENNETT states that he has never observed any thing peculiar about the *blood-vessels* in cancerous or canceroid growths, and that he believes them to present the

* The author has much pleasure in adopting the descriptions given by Dr. BENNETT of this and other tissues, because he has satisfied himself of their accuracy. Both in this country and in Germany, from 1816 until 1820, the author was much engaged in researches, chiefly anatomical, with the aid of the microscope then in use; but he found his eyes so seriously affected that he gave up the pursuit until recently, when the excellence of modern instruments induced him partially to resume it as occasions offered. He has it in his power to state that the observations he has made, which, however, have been comparatively few, have always proved the accuracy of British observers, more especially of BENNETT, WALSHE, BOWMAN, DALRYMPLE, JOHNSON, &c.

same structure, and to be formed in the same manner, whatever that is, as in other tissues.

31. II. CHEMICAL COMPOSITION OF MORBID GROWTHS.—This subject has been considered by BENNETT and WALSH, conformably with recent chemical doctrines; and for a full account of it the writings of these physicians, as well as those of LIEBIG, SIMON, DUMAS, DAY, and others, will be consulted with great advantage, although the chemical nature and relations of morbid growths are very imperfectly known. Dr. BENNETT, indeed, admits that the present imperfect state of organic chemistry renders any investigation into the composition of morbid structures most unsatisfactory. All that can be determined is that morbid growths partake of the same constituent elements as other forms of exudation from the blood; and "that not only are there no means of separating chemically the different forms of scirrhus-cancer and canceroid tumours from each other, but that it is also impossible to distinguish those from other morbid products, or even from healthy tissues. It is not by analyzing large masses of morbid structure, including, as they do, granules, cells, filaments, and salts, mingled together, that any light will be thrown upon the chemistry of tumours; but rather by first separating, with the aid of the microscope, the minute structural elements entering into the composition of the growth, and then by endeavouring, by chemical manipulations under the same instrument, to ascertain the exact nature of each. Chemists have not turned their attention in this direction to any great extent; but histologists are enabled, by the use of very simple reagents, to separate the chemical principles of cancerous and canceroid growths into four groups, viz.: 1st. Albuminous principles; 2d. Fatty principles; 3d. Mineral principles; and, 4th. Pigmentary principles. Farther than this they cannot go; but, fortunately, a knowledge of the relative amount of those is easily obtained, and yields very important information."—(*Op. cit.*, p. 162)

32. i. ALBUMINOUS PRINCIPLES.—Under this head Dr. BENNETT classes *albumen*, *fibrin*, and *casein*, associating *gelatin* with these, although it materially differs from them. Albumen is the most abundant constituent of morbid structures. In this opinion—frequently stated in the course of this work—VOGEL, BRUCH, and BENNETT agree, while they also admit that the more solid parts are fibrin, and that the fluid in which the corpuscles swim is albuminous, the one being necessary to form the filaments, the other the cells. Fibrin may thus be considered as being formed from albumen; for ZIMMERMANN has shown that fibrin results from a change in albumen, and has referred to the experiments of TIEDEMANN and GMELIN on the chyme, chyle, and blood of herbivorous animals, compared with those of carnivorous animals, which show that, notwithstanding the nature of their food, the chyme of the latter contains no fibrin, and their blood less fibrin, than the blood of the former; the fibrinous principle of the food of the carnivora being reduced to albumen during the primary digestion. The experiments of MACENDIE, NASSE, and others have shown that blood deprived of fibrin transfused into an animal, contained fibrin and became coagulable after having circulated for some

time. From these facts it is manifest that the fibrin of the blood is developed chiefly during circulation. On this subject Dr. BENNETT remarks, that "it seems extraordinary, if the muscular and fibrous tissues are formed from fibrin, that this principle should exist in normal blood only in the small proportion of from one to three parts in one thousand—a quantity wholly inadequate for the purpose."

33. But it should be recollected that the nutrition of muscular and fibrous tissues is not merely an attraction of fully developed fibrin, but of the constituents or elements of fibrin, which are changed into, or incorporated with, fibrous structures by the influence of vitality, the fibrin existing in healthy blood being merely the residuum of the conversion of these elements. This view of the subject is supported by what is actually observed in diseases which impede the nutrition of fibrous structures, as in acute rheumatism, pneumonia, consumption, inflammatory fevers, &c., in which the quantity of fibrin in the blood is excessive; for in these diseases the nutrition of these structures is either impeded or arrested, and hence the accumulation in the circulation of the elements forming them favours the development of fibrin in the blood, when vital power is not so far reduced as to prevent the attraction and cohesion of the constituents necessary to the production of fibrin. According to this view the increase of fibrin in the blood is a consequence of inflammatory diseases; the non-incorporation of the constituents of fibrin by fibrinous tissues—or the interrupted nutrition of these tissues—causing an excess of these constituents, and the attraction and cohesion of a certain proportion of them, according to the state of organic nervous energy, in the form of fibrin, during the process of coagulation, when the blood is removed from the system.

34. The existence of *casein* in scirrhus-cancer and in other morbid growths is very doubtful, although its presence has been contended for by several chemical pathologists, in tuberculous and some other diseased structures. MÜLLER proved the presence of *gelatin* in enchondromatous and colloid formations. Dr. BENNETT states, some preparations of colloid in his possession are still perfectly transparent after long immersion in alcohol; while others have been transformed into a white opaque matter, resembling boiled white of egg. Hence the chemical composition of this viscid fluid in cancer may be inferred to differ in different cases; but in what this difference consists, unless it be owing to the quantity of albumen it contains, has not been determined. The able investigator just mentioned remarks that, in a fluid state, the albuminous principles are, with the exception of casein, not affected by the addition of acetic acid; but when once coagulated in the form of molecule, fibre, or membrane, they are again rendered more transparent by this agent. This property of acetic acid enables the histologist to render their sections and filaments of structure transparent, and to partly dissolve cell walls. The filaments and cell walls of scirrhus-cancerous and canceroid growths are composed of albuminous principles, and the more filamentous and dense the structure is, the more does it abound in this chemical constituent.

35. ii. FATTY PRINCIPLES.—The modes in which fatty matters may be produced in the system, in health and in disease, have been much and differently discussed among chemists and chemical pathologists—a class or sect of pathologists which have again risen to celebrity, with LIEBIG at their head. Fatty matter exists in scirrhus-cancer and other morbid growths in four states—as a nearly pure fat, in an almost saponified state, in a non-saponified state, and as a fatty acid. Dr. BENNETT states that it is never structurally free, for, being invariably associated with fluid albumen, no sooner is oil precipitated so as to assume form, than the minutest granule of it becomes inclosed in a thin coagulated film of albumen. Such granules may be recognised by the resistance they offer to the action of weak acetic acid, or by their disappearance on the addition of ether; and their number, in any given point of a structure, is a tolerable index of the amount of fatty matter present. Fat may also exist in the form of crystals of cholesterine, and of margaric acid. The French chemists insist that fat enters the body ready made in the food; while LIEBIG and his disciples maintain that it is formed in the system, 1st, by the *primary digestion*, and, 2d, by the decomposition of the tissues or by *secondary digestion*. It is probable that, in morbid structures, its presence may also be sometimes imputed to a transformation of the albuminous constituents, or of a portion of them.

36. The existence of fat in healthy and in morbid structures may therefore be more correctly referred to the following different sources: 1st. To the introduction of ready-formed fat in the food; 2d. To the early processes of digestion; 3d. To the decomposition and absorption of the tissues; and, 4th. To the transformation of the albuminous principles. The *first* of these sources requires no remark. As regards the *second*, it cannot be doubted that animals which become very fat by feeding on grain must have the power of converting the constituents of these into adipose tissue, as the very small proportion of oil which these contain could not be adequate to this result. The *third* source may be less readily admitted, although various considerations suggest its existence. As to the *fourth* source of fatty production, it certainly exists in morbid formations, and especially in albuminous exudations, more generally than is supposed. I have seen it repeatedly to a very great extent in the albuminous exudations formed between inflamed serous surfaces, more especially in the chronically inflamed cases; and when the albuminous exudations had passed to the state of organized, or partially organized, areolar tissue, this adventitious tissue appearing not only to contain oil-globules thickly disseminated throughout it, but, in some instances of long standing, gradually to pass into masses of fat, identical with other adipose parts. These changes in the adventitious membranes, adhesions, and parts connecting inflamed serous surfaces have been already noticed when treating of the alterations consequent upon inflammations of the *peritoneum* and *pleura*; but they have hitherto escaped the notice of pathologists. I have also observed this conversion of old exudations from, and adhesions between, serous surfaces into

fat within the vertebral theca, in cases of prolonged paraplegia; and very probably this conversion is one of the modes of reparation, or of removing these consequences of inflammatory action, the albuminous principles passing into the fatty to facilitate their absorption through fine vessels or canals.

37. Connected with this subject, Dr. BENNETT remarks, that it is probable, under favourable circumstances, that the albuminous principles may be converted into fat; for pathologists are acquainted with numerous facts which prove that muscular, areolar, fibrous, and other albuminous tissues may be so converted. The universal occurrence of compound granular corpuscles in old exudations is evidence of this, although it may be erroneous to suppose that the original transformation is connected with any influence possessed by cells. DONNÉ, after carefully removing all the globules from milk, and leaving no visible evidence of fat under highly magnifying powers, still succeeded in extracting it by means of ether. "Fat, then, is probably held in solution, and enters the cell wall by endosmosis, where it is precipitated in the form of granules, which become enveloped with a layer of albumen, and are prevented from passing out. In this manner fat, resulting from the disintegration of exudations, becomes accumulated in previously existing cells. Hence various kinds of these bodies act as mere store-houses for excessive formations of fat in morbid growths, as the adipose cells proper perform the same function in healthy tissues. In one, fat exists in the form of granules, in the other as a fluid oil, because pre-existing cells generally have for their contents albuminous matter in a state of solution, which is not the case with the adipose cells."—(*Op. cit.*, p. 166.)

38. When the muscular system undergoes the fatty degeneration, it has been supposed that the deposition of fat by its excess causes atrophy, and subsequently destruction of the muscular fibres. But Dr. BENNETT states that, in watching carefully the progress of fatty transformation, he has convinced himself that it often commences in the very centre of the muscular fasciculus, apparently by the fibrillæ breaking up, losing their continuous and characteristic transverse markings, and assuming the form of minute fatty molecules, which afterward become larger and larger, so as to constitute granules of various sizes. The same change is observed in muscles in the vicinity of diseased parts which for a long time have not been called into action. This observer adds, that "the whole fasciculus becomes thus affected, and at length large drops of oil accumulate in the interstices of the fasciculi, which gradually assume all the appearances of adipose cells, and, by their increase at the expense of the muscular fibre, communicate to it the yellow colour and other physical characters of fat. This conversion of the albuminous principle into the fatty, is brought about independently of the agency of cells or nuclei, and shows that, in the retrograde as in the advancing process of nutrition, the molecular and granular element is the form of structure which is the basis of every other."

39. iii. MINERAL PRINCIPLES.—In scirrhus, cancerous, and various other morbid growths,

as in every other exudation from the blood, more or less of mineral or saline matter is present, the amount, however, of which varies much in different cases. These form into crystals with the progress of decomposition, crystals of the ammoniaco-magnesian phosphate being not uncommon. More generally small collections of phosphate of lime are found either in granules or in masses, or in irregular fragments, which are soluble in the nitric and hydrochloric acids. Sometimes the mineral substance is so abundant as to impart to the dried growth an ossaceous appearance. This change may take place in cancerous as in tubercular formations, although not so frequently, converting portions of either into calcareous concretions. Dr. BENNETT states, that in some forms of canceroid growth, the mineral principle, like the fatty, seems to enter pre-existing cells in a state of solution, and to become afterward precipitated, so as to assume somewhat of an organized appearance.

40. iv. PIGMENTARY PRINCIPLES.—The exudation of blood into the substance of scirrhus, canceroid, and other morbid structures, and the change in the exuded blood, as well as the alteration thereby occasioned in the tissues in which the blood exudes, are manifestly the causes of the different tints of colour which these structures present. The deeper hues are probably owing to some chemical change in the exuded blood and other fluids, and probably the colouring matter of bile may sometimes aid in modifying or deepening the tint. Dr. WALSH considers the bright yellow matter, associated with fatty matter, sometimes forming a reticulum, or collected together in masses, to be analogous to the kirronosis of LOBSTEIN; but LEBERT views it as a peculiar kind of fat, which he calls xanthose. The black matter sometimes found in cancer, is owing either to the action of the morbid secretion of the diseased part upon the globules of the blood in the capillaries or exuded from them, or to the association of melanosis with cancer (*see art. MELANOSIS*, § 4, *et seq.*). That it originates in some change which the blood undergoes, is shown by the circumstance of this change having been traced in the same specimen through all the intermediate tints from blood-red and rusty brown to the deepest black. Dr. BENNETT has ascertained that the colour of the black matter occasionally found in cancerous growths is destroyed by nitric acid and chlorine—a change which distinguishes it from the black matter which commonly accumulates in the bronchial glands and lungs of old people, and in the black phthisis of colliers. In the latter instance the black matter is undoubtedly carbon, in the former its nature is unknown.—(*See arts. LUNGS*, § 185, and *MELANOSIS*.)

* According to SIMON and DAY, the following *proximate analysis* of scirrhus have been made by M. L'HERETIER:

	Of Breast.	Of Uterus.	Of Dorsal Region.
Water	29.75	21.15	24.80
Albumen	28.10	29.85	21.70
Fibrin	18.80	15.20	27.15
Gelatin	7.60	.....	8.17
Fat	2.00	.....	8.05
Phosphorized fat .....	.....	6.00	.....
Proxide of iron	1.15	1.25	traces
Yellow pigment .....	.....	7.00	.....
Salts	12.60	9.55	10.13

A fatty growth analyzed by NEES VON ESENBECK con-

41. III. GENERAL ANATOMY OF SCIRRHOCANCEROUS AND OTHER GROWTHS.—i. OF SCIRRHOCANCEROUS GROWTHS.—Continuing to adopt the description of Professor BENNETT, these growths are constituted of nucleated cells, presenting the characters attributed above to cancer-cells (§ 13, *et seq.*), and infiltrated among the meshes of a fibrous stroma. Conjoined with the fibres and cells there is invariably present a viscous fluid, in which the cells swim, as seen under the microscope. The fibres, the cells, and the viscous fluid, are the three essential elements of these growths; and it is the relative amount of each which determines the species of cancer. "If the fibrous element be in excess, it constitutes *scirrhus*, or hard cancer; if the cells be numerous, *encephaloma*, or soft cancer; and if the fluid abound, or be collected into loculi or little cysts, it is *colloid* cancer. All these forms of cancer may frequently be observed in the same tumour—in one place hard or scirrhus; in another soft or encephaloid; and in a third jelly-like collections, or colloid. Yet, although they may pass into or succeed one another, they are not infrequently distinct from their origin to their termination."

42. A. *Scirrhus*.—Hard cancer has been fully described in the article CANCER; and I have therefore only to add at this place, that at all times a pulpy substance may be removed from a fresh-cut surface of it by scraping, which, on microscopic examination, is seen to contain numerous cancer-cells, mingled with molecules, granules, and fragments of fibrous tissue, an appearance which distinguishes scirrhus from certain forms of fibrous tumour, which to the naked eye exactly resemble it. A thin section of the scirrhus growth is seen to be principally composed of filaments, of various sizes, running in different directions, sometimes forming waved bands, at others an inextricable plexus, among which the cells may be seen infiltrated, or forming loculi or cysts inclosing masses of these cells.

43. B. *Encephaloma*.—Soft or brain-like cancer has been considered in the article FUNGOID DISEASE. It consists of a soft pulpy growth, of a whitish, yellowish, or bluish tint, breaks down on moderate pressure, and yields a copious milky or creamy juice. It presents different degrees of vascularity; reddish parts or spots appearing, owing to extravasations of blood, or to degrees of vascularity. On examining a fresh-cut section, it presents a very loose fibrous texture; but in the denser parts it approaches the character of the soft portions of scirrhus. In the pulpy parts no trace of fibres is visible, or merely fragments of them. Yellowish parts, either reticulated or collected into masses, generally consist of fatty degeneration of the cancerous tissue, and form the

tained 230 of solid fat; 120 of extract of flesh; 110 of gum-like animal matter; 230 of albumen; 190 of phosphate of lime; and 15 of carbonate of magnesia. It is not stated whether this solid fat contained cholesterine; in all probability it did, as this substance is often found in fatty tumours. In a fatty tumour examined by MÜLLER acicular crystals were found mixed with a gray substance which was deposited in vesicles and dissolved by boiling water, from which it was not precipitated by acids or the ordinary metallic salts. The crystals were insoluble in acids, water, or alcohol, but dissolved in ether; hence they probably consisted of cholesterine. Another fatty tumour contained some casein, precipitable from the aqueous solution by acetic acid.

cancer reticulare of MÜLLER. This yellow matter is often of cheese-like consistence, friable, and resembles tubercle, for which it has been mistaken. The blackish tinge is owing to black pigment (§ 40) infiltrated in the cancerous elements, or existing within the cells, constituting the malignant melanosis, or melanic cancer of some authors. The cream-like fluid presents, under the microscope, a number of the cancer-cells already described (§ 13, *et seq.*), sometimes mingled with a large number of molecules, granules, compound granular cells, blood-corpuscles, and more or less of the fibrous element. (*See art. FUNGOID DISEASE.*)

44. *C. Colloid or Gum Cancer.*—Glue cancer, or collections of gelatinous matter resembling glue, calves'-foot jelly, or semi-fluid gum, are found in masses varying from a minute point to the size of a large orange. In colour colloid is yellowish, grayish, brownish, or reddish; very rarely green or black. It may be transparent or amber-like, or semi-transparent or opaque, resembling honey. It may be disseminated in a fibrous texture, giving it a pearly aspect, or it may be collected in distinct cysts. "It is one of the most common constituents of compound encysted growths of the ovary, and it is not infrequently seen in cysts of the kidney, and follicular swellings of the skin."—(BENNETT.) On examination with the microscope, this substance is occasionally seen quite structureless, or exhibits only a fine molecular appearance, and it then has been called *colloid tissue*. At other times numerous nucleated cells, presenting all the characters of cancer-cells, in various stages of development, are found in it as a blastema; and it is then observed that the growth has a tendency to spread. This is *colloid cancer*.

45. "When colloid cancer is formed on a free surface, as on the peritoneum, it often presents small grains of a gray colour, resembling coagulated gum-arabic. When collected in masses, these have an irregular nodulated aspect. A fresh section presents a surface with numerous loculi or cysts, which vary from the size of a pin's head to that of a walnut, filled with a clear glistening gelatinous matter, surrounded by fibrous substances or mesh-work." Cancer-cells originate in colloid matter, as in other kinds of blastema, by the formation of granules, nuclei, and cells. The fibrous structure of colloid, according to Dr. BENNETT, never contains permanent nuclei, or affords any evidence of being developed from nuclei or cells; it seems rather to be formed by precipitation alone.

46. D. These *three forms* of true cancer are vascular, but in different degrees. Scirrhus is least so; colloid is more so than scirrhus; and encephaloma is most vascular—sometimes so much so as to bleed readily and profusely. These forms pass into each other, sometimes so imperceptibly as to render the arrangement of several specimens a difficult matter; more especially as respects scirrhus and encephaloma or fungoid cancer.

47. ii. OTHER MORBID GROWTHS.—Morbid structures, which, to the unaided sight, to the touch, and often in the progress of the case, so closely resemble cancer as to be frequently mistaken for it, and yet which present on microscopic examination differences of a very

marked character, have been termed *canceroid* by Dr. BENNETT. Hitherto, he remarks, this distinction has not been very accurately attended to; for, although practitioners have recognised the existence of fibrous, sarcomatous, warty, fatty, and other so-called non-malignant growths, experience every day proves that there are no symptoms which enable them to detect these with certainty.

48. *A. A fibro-nucleated canceroid growth* is described by this writer to consist of filaments infiltrated with oval nuclei. It can be distinguished from scirrhus and from encephaloma only by microscopic examination, as it sometimes closely resembles the one, and at other times the other. As to its minute structure, this growth ought to be separated from true cancer on the one hand, and from fibrous tumours on the other. It is deficient in cancer-cells, which are essential to the first; and it possesses numerous naked nuclei, in no way connected with cell-formation, which are not found in the second. This form of canceroid growth, however, evidently so closely resembles cancer, or possesses so much of what has been usually called the malignant character in other respects, that a diagnosis is difficult. The most important distinction between it and true cancer is that, although it may return in the place originally affected, after excision, it does not appear ever to occur secondarily in the glands or other organs.

49. *B. Epithelial Canceroid Growths.*—Dr. BENNETT considers that cancer of the lip, chimney-sweeper's cancer, *noli me tangere*, malignant ulcer of the face, cauliflower excrescence of the uterus, and other appellations are given to morbid growths, which have been considered cancerous or malignant, but which possess a very different structure, and are therefore only canceroid. Mr. PAGET pointed out the identity of several of these, considered them as warty in their nature, and ascribed them to hypertrophy of the papillæ of the skin. Dr. SIMPSON classed cauliform excrescence of the cervix uteri with soft warts and condylomata, and stated that it had often been confounded with carcinoma or medullary fungus. Examined by REID and GOODE, it was shown to consist of groups of large nucleated cells. These and similar alterations of the epidermic and mucous surface Dr. BENNETT views as epithelial canceroid growths, and as essentially consisting of an hypertrophy of the mucous or epidermic layer, composed of numerous epithelial-cells more or less impacted together (§ 18). They may occur on large free surfaces, as the skin or digestive mucous membrane; or within mucous follicles, and the minute ramifications of secreting glands, as the mammaræ, kidney, &c. In the former case, corns, callosities, condylomata, warts, and scaly eruptions of the skin, or polypi and fungous excrescences of the mucous membrane are occasioned. In the latter case, various kinds of encysted swellings, hairy and horny productions, and dilatation of the minute ducts in secreting glands, by the desquamation and retention of their contained epithelial-cells, are produced. The forms of epithelial growth which more especially resemble cancer, and which are therefore canceroid, are, 1st. Certain warty and fungoid excrescences of the skin and mucous surfaces; 2d. Some

ulcerations of mucous membranes, especially those of the lip, tongue, and cervix uteri; and, 3d. The changes occurring in follicles and excretory ducts, the latter, when associated with hypertrophy of the surrounding fibrous tissue, constituting some forms of so-called sarcomatous tumours.

50. (a) *Warty and fungous excrescences* are very common. The former are often observed on the fingers of young persons, more especially of those addicted to the vice of self-pollution; and they sometimes also appear about the face and neck. They consist of a congeries of elongated papillæ, sometimes flattened at the top, at other times presenting fissures and sulci leading to a common root. These tumours may vary from the size of a millet seed to that of a child's head. Dr. BENNETT describes them as having their surface sometimes smooth, at other times lobulated, composed of rounded groups of papillæ resembling a cauliflower. When small, they are almost wholly composed of epithelial scales, which assume a square or elongated form, their nuclei being usually very distinct. The larger growths internally consist of a fibrous structure, into which loops of vessels from the capillary net-work of the dermis are prolonged. They are covered by compressed epithelial scales. They often soften and ulcerate on their surface or at their base, some of the epithelial-cells then enlarging from endosmoses and often resembling cancer-cells, while others are elongated and split into fibres. Mingled with the altered cells are numerous molecules and granules, and often pus-corpuscles, giving an ichorous character to the discharge from the sore or ulcerated surface. In this manner a cancrroid ulceration may be produced, and proceed to a greater or less extent, the base of the ulcers being generally covered by papillated fungoid projections, the edge being elevated, indurated, and rugged.

51. The *polypi* which grow from the surface of mucous membranes are covered externally by thickened epithelial-cells, are internally composed of fibrous tissue more or less dense, and are abundantly supplied with blood-vessels. They resemble in structure the excrescences just described, and like them may ulcerate, the ulceration, however, being much more frequently attended by hæmorrhage. These polypi are very common in the cervix and os uteri, and less so in other mucous surfaces.

52. (b) Another form of *epithelial cancrroid* is described microscopically by Dr. BENNETT as appearing first as an ulcer, sometimes as a slight induration of, or small wart on, the affected part. It is common on the under lip, on the tongue, and in the cervix uteri. In the lip, a furrow or groove is often observed early in the indurated spot. This slowly extends, in the form of ulceration, with indurated, thickened, and raised margins, is circular and cup-shaped, its surface being sometimes covered by white cheesy matter, at others by a thick crust; and proceeds until it involves a considerable portion of the structure, pouring out a foul ichorous discharge. In the tongue the base of the sore is fungoid and papillated, and dense, owing to the close impaction of laminae of epithelium. On the cervix uteri, these ulcers have hard, irregular edges, yield a copious ichorous discharge, and cause more or less

thickening of the adjoining textures. When examined microscopically, these cancrroid ulcers present on their surfaces masses of epithelial-cells in all their stages. Some of these cells are spherical, nucleated, about 1-50th of a millimetre in diameter; others much larger. They often resemble cancer-cells when viewed alone, but are associated with flattened scales, varying in size and shape, sometimes in groups adhering at their edges, at others forming confused masses. Many of the cells and scales often reach an enormous size, and as they become old split into fibres. These elements are commonly associated with numerous molecules and granules, naked nuclei, fibro-plastic, fusiform, and pus-cells. Immediately below the surface, the epithelial-cells are more or less compressed and condensed; and, when the disease is very old, they present concentric laminae, surrounding a hollow space.

53. (c) *Cystic growths*, consisting of epithelial cells and scales, often occur in minute follicles and crypts. They may also form within the excretory ducts of glands. They have been well described by M. LEBERT and by Dr. BENNETT. The contents of these cystic growths are not merely epithelium-cells in all stages of development, but also fatty cells, granules, and crystals of cholesterine. These obstruct the duct, and then enlargement or tumour of a cystic kind is formed. These cysts vary from the size of a pea to that of a large orange; their appearance varying with the proportion of epithelium, or of fat, or of cholesterine they may contain. Quantities of epithelium are also thrown off from the lining of the lateral ventricles in cases of cerebral meningitis, and in the ovaria during ovarium dropsy.

54. "In many fibrous, or so-called sarcomatous growths in glands, we frequently find the hypertrophied filamentous tissue forming loculi which vary in shape with the amount of lateral pressure they receive. This may occur in cancerous and cancrroid growths, and the spaces so produced may be occupied by either cancer or epithelial cells. Hence, even on a microscopic examination, the latter may be readily mistaken by an experienced histologist for cancer. The fibrous tissue in both cases is the same, but the cells present the differences formerly pointed out between cancer and epithelial cells (§ 18), the latter being frequently about the same size, and exhibiting a great disposition to run together in groups." The cystic formations in sarcoma are caused by the same circumstances as produce simple cysts in the liver, kidney, and other granular organs: the minute excretory ducts are obstructed by granular exudations or exfoliations, and fluids accumulating behind them produce dilatations or cysts. Hence the frequency of encysted growths in structures furnished with follicles or ducts. Occasionally the epithelium is so closely impacted in the dilated ducts as to be turned out in the form of moulds of the tubes on making a section through them. "This form of epithelial accumulation in the ducts of glands, which are the seats of fibrous or sarcomatous growths, merits great attention, as to this circumstance must be attributed their great resemblance to cancer" (p. 183).

55. *C. Fibrous cancrroid growths* consist wholly of fibrous or filamentous tissue, and so close-

ly resemble scirrhus as to be continually mistaken for it. This fibrous tissue is formed as above described (§ 27, 28), and it may be thus produced in various tissues and organs. This tissue is the most universal both in healthy and diseased parts. It forms the stroma, or frame-work, of nearly all the tissues. "It exists in almost every kind of canceroid and cancerous growth: so that a fibrous tumour is one of these, minus the nuclei and cells, which give to each its peculiarities. Fibrous growths present themselves in numerous forms. One of the most common is that of *cicatrix*; another is that of a white glistening patch, so common on serous surfaces; a third is the chronic band or ligamentous tissue uniting serous membranes, the result of simple exudations of some standing; and a fourth is the peculiar induration of the skin, constituting sclerosis in children and elephantiasis in adults" (p. 184). Canceroid fibrous growths assume two principal forms: 1st. Thickening or hypertrophy of the sub-areolar tissue of mucous membranes; 2d. Tumours of different varieties.

56. *a. Thickenings and indurations of the sub-mucous areolar tissue* cause strictures of canals, as in the alimentary canal, urethra, &c. They may follow any protracted irritation causing exudation. Chronic irritation of the stomach, or gastritis, may induce a similar lesion, with hypertrophy of the muscular coats, so as closely to resemble scirrhus; and many cases of stricture of the intestines have a similar resemblance; and yet upon a close examination they contain nothing but the elements of fibrous tissue—are merely simply fibrous. This form of morbid growth consists almost entirely of dense bands of filaments of a glistening or dull white colour. Here and there, naked nuclei varying in size, or fibro-plastic corpuscles, mingled with fusiform bodies, may often be detected between these fibres.

57. *β. Fibrous canceroid tumours* comprise, besides those which are strictly fibrous, those which have been usually called sarcomatous and neuromatous. Dr. BENNETT considers them all "to consist of a fibrous structure in different stages of development, the softer and more vascular forms being such, even when their elements have not yet completely passed into the perfect fibrous state. For this reason they have been made to constitute a distinct group by LEBERT, under the name of fibro-plastic tumours. Such growths may always be seen passing into true fibrous tissues. In some, while one part may be called sarcomatous or fleshy, another is truly fibrous. Other kinds of fibrous tumour resemble tough ligament and fibro-cartilage, presenting all kinds of intermediate degrees of conversion between the areolar and elastic tissues. Fibrous tumours may therefore be divided into, 1st. Sarcomatous; 2d. Desmoid; 3d. Chondroid; and, 4th. Neuromatous fibrous tumours" (p. 185).

58. 1st. *Sarcomatous tumours* are either spherical or more or less lobulated. The first are of the consistence of muscular tissue or soft cartilage. Their surfaces, when divided, are smooth or finely granular, and their colour varies from a whitish yellow to pink or deep red, with the amount of vascularity. Sometimes, on section, the surface is mottled from an intermixture of these tints, or echymosed. The vascularity of these tumours disposes them to ulceration

and to the breaking down of their substance with the formation of a purulent fluid. They are generally encysted, originate in cellular tissue, and are found in fibrous and osseous structures. In the last-named situation they have been called osteo-sarcoma, a name which has been sometimes given to cancerous disease in this situation. LEBERT considers fungus of the dura mater to be sarcomatous. These tumours increase in size slowly, causing injury by their pressure on adjoining parts, not only impairing function, but producing absorption and ulceration of the parts pressed upon. In a gentleman whom I attended for gradually increasing hemiplegia, passing slowly into general palsy and coma, one of these tumours existed in the upper jaw and another in the pericranium, and I stated that the palsy was most probably owing to a similar formation in the dura mater. On examination after death, this was found to be the case; a large tumour on one side having caused the hemiplegia, a small one being also present on the other side, and having produced the palsy of the other side also, shortly preceding dissolution. (*See art. BRAIN and MEMBRANES, § 8, 9.*)

59. Sometimes these tumours are more soft and lobulated, and are then readily mistaken for encephaloma. The lobules vary greatly in size, have externally a papillary or cauliflower appearance. They frequently resemble the pancreas, and were hence called pancreatic by ABERNETHY. The lobules are surrounded by a layer of more or less dense areolar tissue, and are of a grayish, yellowish, or rosy colour, according to their vascularity.

60. These tumours are found in many places below the skin copiously supplied with cellular and fibrous tissue. They are not infrequent in the mammae, and in this situation they are distinguished from scirrhus with the greatest difficulty. M. LEBERT describes small mushroom-like growths on the conjunctiva which are sarcomatous, and which may destroy the eye by their size and pressure. Dr. BENNETT has found many granulations on the valves of the heart to consist of a sarcomatous and fibrous structure.

61. "The minute structure of these tumours is essentially fibrous, but many of the fibres are seen to be made up of congeries of fusiform cells closely applied together. These cells are of a spindle-shape, varying in length and breadth, and for the most part distinctly nucleated. Many of them may be seen branched at their extremities and passing into fibres, according to the mode of development of fibrous tissue described by SCHWANN. In some the nucleus will be found to have disappeared. Others of the cells will be found round or oval, or only slightly elongated; these are younger growths. In the same tumour all these different stages may be observed. In the softer parts, isolated cells and nuclei abound; whereas in the harder and denser parts the development into fibrous tissue will be found more perfect" (p. 187). Some of the softer forms of sarcomatous growths contain cysts, and in these groups of transparent cells are observed, which present on the addition of acetic acid distinct round nuclei, about one third the size of the cell. These cells closely resemble epithelial cells. The fibrous structure sometimes forms loculi, which

may be crowded with these cells, so that in these cases fibrous and epithelial growths are conjoined

62. 2d. *Desmoid fibrous tumours* are generally of a white or whitish yellow colour, tough and elastic, resembling the structure of the dermis. They are of a rounded or oval form, often imbedded in a cyst, consisting of the structures in which they lie. They vary in density from that of tendon to that of fibro-cartilage. On section they present numerous white glistening fibres intimately interwoven, or arranged in bundles, forming circles or loops interlacing with each other. They sometimes have a bony centre or nucleus. They are not very vascular. They vary in size from that of a pin's head to several feet in circumference. Dr. BENNETT possesses one four feet in circumference, and he refers to one still larger. They may occur in various tissues and organs—in the sub-cutaneous cellular tissue, in the sub-mucous tissue, and in the mammae and uterus, where they are common. In the last situation, they often push the mucous membrane before them, and in this way grow outward, forming one of the so-called polypi uteri. In other cases, they grow towards the serous or peritoneal cavity, pushing the membrane before them, and thereby forming a neck by which they are attached to the uterus, as if growing from it. The pedicle thus formed may break off, and the tumour thus become free in the peritoneal cavity. In the same way these tumours may become detached in the joints, loose fibro-cartilages, and even in the veins, when they have been named *phlebolites*. The minute structure of these tumours is chiefly filamentous, the fibrils varying from the 1-700th to the 1-800th of a millimetre in diameter. Their softer portions may be separated by a fine needle, but this is impossible in the denser parts. Sometimes the filaments are more or less waved; at others, they are curled and brittle, as in elastic tissue. Occasionally fusiform nucleated cells are found, indicating that these fibres are probably formed from cells. Sometimes isolated nuclei and corpuscles are also found, as in sarcomatous tumours, but the proportion of them is very small. The bony centres of these tumours are sometimes cartilaginous, at others composed of amorphous mineral matter, more rarely of true bone, two instances of which latter were seen by M. LEBERT.

64. 3d. *Chondroid fibrous tissues* were first accurately described by MÜLLER, and shown by him not only to resemble cartilage, but also to possess much gelatin in their composition. They vary in shape. When divided they present a smooth, milk-white, glistening surface, like fibro-cartilage. Their thin substance is very dense, separated with great difficulty by needles, but easily cut into thin layers. It crunches under the knife, and is very little vascular. Its intimate structure consists of fibrous tissue, resembling the fibro-cartilage of the ear, or the intervertebral substance.

64. The preceding kinds of fibrous structure may be associated in one tumour. Some are composed of several rounded or oval masses, varying in size, and surrounded, and separated from each other by a cyst, or layer of areolar tissue. The external surface, under such circumstances, is more or less modulated. Some of these are occasionally soft and pulpy—semi-

gelatinous, with a very sparing layer of fibrous tissue, while others are more or less tough, gradually passing into a fibro-cartilaginous density, and grating under the knife. Dr. BENNETT has observed, even of one nodule, parts soft and others hard, the former being cellular, the latter fibrous, every degree of variation existing between them.

65. 4th. *Neuromatous fibrous tumours* are formed in the nerves, sometimes spontaneously, at others consecutively of injuries, especially of amputation. In the museum of the Richmond Hospital, Dublin, a series of these tumours is preserved, most of them taken from a person in whom almost every nerve presented knotty swellings, some of them varying from the size of a nut to that of a child's head. Dr. BENNETT examined them microscopically. Having been long kept in spirit, he could only determine the existence of fibrous bands running in various directions, mingled here and there with compound granular masses. In some fresh neuromatous tumours which he examined, it was demonstrated "that, in addition to bands of fibres running in wavy lines, and sometimes forming loops, there were occasionally transparent cells, with a nucleus composed of two or more small granules, not affected by the addition of acetic acid" (p. 190).

66. *D. Cartilaginous canceroid growths* were first separated from cancerous and osteo-sarcomatous tumours by MÜLLER, who called them *enchondroma*. "When found in soft parts, or merely attached to bones, they are surrounded by an envelope of condensed areolar tissue, when in the bones, by a bony capsule. In the first case they occur, although very rarely, in the glands, as in the parotid or mamma. In the second case, they are most common in the bones of the extremities. When formed in the substance of long bones, they present rounded, smooth tumours; when in the periosteum or flat bones, their surface is rough and nodulated." The structure of *enchondroma* is the same as that of cartilage; it presents transparent nucleated cells, varying in size, isolated or in groups, situated in a hyaline substance. A net-work of filamentous tissue runs through the substance of the tumour, forming areolæ in which blood-vessels ramify. The cartilaginous and areolar tissues vary in amount in different tumours. Sometimes the cartilage is in excess; and it then resembles that of young animals, the cells being unusually large. When the fibrous element abounds, then the whole mass is identical with fibro-cartilage, as in sarcomatous tumours (§ 58-61). Between these extremes there are infinite varieties, many of which may often be seen in one tumour. Occasionally a bony nucleus is found in a nodule of *enchondroma*, and sometimes these nodules present all the stages of transformation into bone.

67. Notwithstanding these peculiarities of structure, these tumours are often mistaken for osteo-sarcomatous or cancerous growths, chiefly owing to their occasional softening, and to their presenting, in such circumstances, the external characters of encephaloma. The softened portion, even under the microscope, may, without great care, lead to error, as the cartilage-cells which float loose, mixed with granules and debris of the tumour, closely resemble those in cancerous growths.

68. *E. Fatty canceroid growths*, in the form of tumour, when mingled with fibres and other elements, may be mistaken at first sight for scirrhous. "Fatty tumours vary in size, but they may reach a growth weighing 30 lbs. Sometimes their surface is smooth, at others lobulated. They are of a yellow colour, resembling adipose tissue; sometimes divided into bands by white fibrous tissue. The relative amount of these two elements varies greatly in different specimens; some being soft, oily, containing few fibres; others being harder, dense, the areolar tissue preponderating. For the most part they are very sparingly supplied with blood-vessels, but these abound more in the fibrous varieties. In the latter case they are liable to ulcerate, and, under such circumstances, have frequently been mistaken for cancer. Some of these tumours, indeed, may be considered as fibrous or sarcomatous, combined with an unusual quantity of fat. Occasionally they are connected with the ordinary adipose tissue of the body. They are often surrounded by a delicate cyst or envelope; sometimes this is not perceptible. When the collection of fat resembles the ordinary adipose tissue, the tumour has received the name of *lipoma*. When it is more lardaceous, some have applied to it the term *scatoma*, in the same manner as when the substance is encysted."—(*Op. cit.*, p. 193.)

69. The minute structure of these tumours varies with the amount of adipose or of fibrous tissue. The former is composed of vesicles of a round or oval form, altered more or less in shape by pressure. The vesicles vary from the 1-20th to the 1-50th of a millimetre in diameter. They are composed of a diaphanous cell wall, frequently including a nucleus. The nucleus is round or oval, about the 1-100th or the 1-200th of a millimetre in diameter. Occasionally it appears stellate, of a crystalline aspect, from the formation of crystals of margarine or margaric acid around it. On rupture of the cell wall the oil may be made to flow out, and the cell wall shrinks up. Collapsed cells may often be seen among the more perfect vesicles, mixed with globules of oil and fat granules. The fibrous element consists of filamentous tissue running between groups of adipose cells, but is denser, and occupies more space, according to the proportion in which it enters into the tumour. Steatomatous and melicerous fatty matter may sometimes consist chiefly of the cells or vesicles just described; or these may be mingled in various proportions with granular matter. In some melicerous encysted growths Dr. BENNETT found the whole to be composed of granules, among which faint traces of delicate cell walls might be observed more or less compressed together. In all such productions the relative amount of the vesicular and granular element varies greatly.

70. Another form in which fat may occur is that of *atheroma*, consisting, for the most part, of numerous fatty granules, varying in size. *Atheroma* may constitute the contents of cysts, or the entire degeneration of certain glands, especially the mesenteric and lumbar. The fatty granules composing it vary from the 1-600th to the 1-400th of a millimetre in diameter. They almost entirely disappear in ether, leaving only a molecular albuminous matter. Similar fatty granules are also associated with most

morbid formations, sometimes free, at others existing within cells. "This kind of atheroma is identical in structure and chemical composition with certain forms of the reticulum in cancer. The granular fatty matter is often combined with crystals of cholesterine, more or less numerous." Sometimes they accompany various kinds of chronic exudation, and formations of epithelium, as above noticed (§ 53).

71. *F. Tubercular growths resembling cancer* are not uncommon. Dr. BENNETT remarks, that a mass of enlarged tubercular lumbar glands in his collection presents all the external characters of cancerous growths, and that he has no doubt that many cases of so-called cancer of the brain and other structures in youth are only tubercular; for, however easily the tubercular structure may be distinguished in its milky or infiltrated forms, it may closely resemble cancer when it exists only in one or two large rounded masses in an organ, and is more or less softened. In such cases it can be distinguished only by a microscopic examination. The characters of tubercle which readily distinguish it from cancer, therefore, require to be pointed out. A tubercular mass presents a yellowish or dirty white colour, and varies in consistence from that of tough cheese to that of thick cream. Sometimes it is soft in one place and indurated in another. On dividing the harder parts, the surface is smooth or waxy; the softer parts present a slightly granular surface. On pressure they are friable, and break down into a pulpy matter, but never yield a milky juice. "A small portion squeezed between glasses, and examined under the microscope, presents a number of irregular shaped bodies approaching a round, oval, or triangular form, varying in their longest diameters from the 1-120th to the 1-75th of a millimetre. These bodies contain from one to seven granules, are unaffected by water, but rendered very transparent by acetic acid. They are what have been called tubercle corpuscles. They are always mingled with a multitude of molecules and granules, which are numerous as the tubercle is more soft. Occasionally, when softened tubercle resembles pus, constituting serofulous purulent matter, we find the corpuscles more rounded, and approaching the character of pus-cells. They do not, however, on the addition of acetic acid, exhibit the peculiar granular nuclei of these bodies." Tubercle corpuscles are very readily distinguished under the microscope from cancer-cells. Compound granular masses and cells, mineral matters, crystals of cholesterine, and the debris of the texture in which the morbid product is found, are also often detected in tubercular masses of some standing. These masses may also be sometimes transformed more or less into cretaceous and calcareous substances, and either remain latent or be thrown off.

72. *G. A tumour*, which M. VELPEAU has called *fibrinous*, is occasionally met with. It may, under certain circumstances, be mistaken for cancer. It is caused by an extravasation of blood, which coagulates, becomes paler, and ultimately yellow, like a clot of blood in the sac of an aneurism. These tumours vary in size, may occur in various situations, especially in the female breast, when they may be mistaken for cancerous tumours. Dr. BENNETT has also seen these tumours in different textures, espe-

cially in the placenta and in the spleen. The structure of one found in the spleen consisted of numerous molecules and granules, fusiform corpuscles, compound granular masses, and irregularly formed bodies, probably altered blood corpuscles, such as are commonly found in old extravasations. Instances in which these tumours in the breast were mistaken for cancer have been recorded by MM. LEBERT and BERARD.

73. *H.* A peculiar form of tumour, which HENLE has called *syphonoma*, is described by him and Dr. BENNETT. The specimen seen by the latter consisted of a large mass attached to the mesentery, that was in one place hard, fibrous, and nodulated, in another soft and cheesy, or even purulent, and in a third fibrous, but soft and of a dark red, resembling coagulated blood. Having been long steeped in spirits, its minute structure could not be exactly ascertained. The part examined resembled a vascular plexus, anastomoses here and there having been distinctly seen.

74. *I.* The *enlarged glands* which accompany *typhoid ulcerations* in the intestines, and which are sometimes found, especially in the mesentery, will rarely be mistaken for cancer. They vary in size from that of a hazel-nut to that of a hen's egg. They are vascular externally, of a bright red or purple colour, are soft and pulpy to the touch, and on section present a slightly granular surface, of grayish or fawn yellow colour, frequently exhibiting the commencement of softening. They are friable, and yield a grayish or dirty purulent-looking fluid on pressure. The matter infiltrated into the texture of the gland is the typhous deposit of ROKITSANSKI, ENGEL, and other German pathologists. The fluid squeezed from these glands was found by Dr. BENNETT crowded with cells, naked nucleoli, blood corpuscles, granules, and molecules. The cells are generally spherical, varying in diameter from the 1-50th to the 1-35th of a millimetre. The nucleus occupies about three fourths of the cell, and is composed of an aggregation of numerous nucleoli, of about the 1-200th of a millimetre in diameter. "Sometimes from one to four of these nucleoli are seen scattered within the cell, either with or without a round or oval transparent nucleolated nucleus. On the addition of acetic acid the cell wall is rendered very transparent, while the nucleoli are unaffected. Many of them are free, and looked at first like altered blood globules, from which they are at once separated by the action of acetic acid. I have called these bodies nucleoli, from their holding that relation to the nucleus in well-developed cells, although at other times they may be considered as nuclei, no other bodies being present within the cells."—(BENNETT, *Op. cit.*, p. 200.)

75. *IV.* PATHOLOGICAL RELATIONS OF SCIRRHUS AND OTHER TUMOURS.—*I.* OF SCIRRHUS GROWTHS.—*A.* The *origin* of these growths has been the subject of much discussion. In the article CANCER certain views of this matter have been noticed, but others have been recently published. It was supposed by VELPEAU (*Revue Médicale*, t. i., 825, p. 357), from two cases in which encephaloid-looking matter was found in venous coagula, without disease of the veins; that cancer may form primarily in the blood; but there is no evidence that the matter was

really cancerous in these cases. VIRCHOW, however, states that he has seen cancer in the large venous trunks in six cases, and that he is convinced that they may thus arise locally in coagula of blood. GLUGE and NONAT discovered cancer-cells in a clot in the right iliac vein, the walls of the vein being smooth and not red; but in these, as in several others which have been recorded, cancerous disease existed in the viscera, and the cancerous matter in the blood may have arisen from venous imbibition. In the present state of our knowledge there is no proof that cancer may exist in the blood primarily, or independently of similar growths in other parts of the body. It is possible, however, that the liquor sanguinis may, in peculiar circumstances, act as the blastema of cancer within the vessels as well as when exuded; such an occurrence, however, must be rare. Dr. BENNETT, whose researches have been so able, infers that the filaments, cells, and fluid, which together compose scirrho-cancerous structures, originate in a coagulated exudation, which is poured out in the same manner as other forms of exudation—namely, by enlargement of the capillaries, their repletion with blood, and the transudation through their coats of the transparent liquor sanguinis, which, coagulating outside the vessel, forms an exudation more or less solid. The exudation, when first perceptible, consists of a finely molecular and granular matter, in which the cancer-cell arises as in a blastema, in the manner already described (§ 14). This view accords with that which I have stated in the article CANCER (§ 26), and shows that the change in the blastema, or exuded fluid, depends upon the state of constitutional and local vital endowment.

76. The exudation constituting the blastema of cancer is generally infiltrated between the filaments of areolar tissue. The nature of the tissue influences the formation of adventitious growths; and the areolar tissue, probably from its lower vital endowment, seems to favour the production of scirrho-cancer. While part of the exudation in this tissue passes into cells, another portion becomes fibrous, as observed to occur in a simple exudation during the healing of an ulcer or wound. All that is known of this stage of the production is, that filaments and fibres are formed, which are interlaced among the granules and cells of the blastema, to constitute the stroma of the growth, the form and density of which is dependent upon its arrangement and amount. "At first the cancerous exudation is fluid; and some of the albuminous principle held in solution, by coagulating, allows a certain quantity of serum to be set at liberty. In most instances this is in a great measure absorbed; but in a few, owing perhaps to some peculiarity in its formation or amount, it is retained in the meshes of either the pre-existing or new areolar tissue." Such Dr. BENNETT considers to be the origin of colloid cancer. The colloid matter so collected becomes in turn a blastema for the formation of cancer-cells, as above described (§ 14).

77. It is obvious that the exudation productive of scirrho-cancer must differ, either primarily or consecutively, or both, from the exudation of inflammation, or of scrofulous or tubercular cachexy. In what the difference consists we are ignorant. In this the histologists have

not enlightened us. Most probably the cancerous exudation is primarily different from these, owing to the state of vital endowment of the tissue affected, and that the difference increases with the retention of the exudation in the tissue which it infiltrates. The characters imputed to the blood by ROKITSKI, ENGEL, HELLER, and others, assigning a specific dyscrasia of the blood, or an excess of albumen or of fibrin in the blood, are vague, uncertain, and unsatisfactory. Dr. BENNETT believes that the cancerous peculiarity depends not upon the vascular system, which is the mere apparatus for the production of the exudation; not upon the nervous system; and not upon the texture, which is merely the seat of the exudation, as that varies; but in the inherent composition or constitution of the exudation itself. But in this belief this pathologist is not sufficiently precise; for if he means by the nervous system the spinal nerves, then it may be admitted that these can have little or no influence in determining the nature of the adventitious growth produced from a fluid blastema. It is, however, by no means so certain that the soft or ganglionic nerves, which supply the vascular system, and which preside over nutrition and secretion, are so unconcerned in determining the nature and growth of the morbid formation as here stated. We know that all the forms of scirrhus-cancer appear in circumstances and from causes which depress organic nervous energy, and impair the activity of the excreting or depurating functions; and which, moreover, diminish vital resistance, and favour the development of adventitious cell-formations and of parasitic productions. As these cell-formations become more perfect, and acquire the power of self-development, so as to spread and invade adjoining tissues, they soon burst forth, ulcerate, contaminate the circulation, and form exuberant fungoid excrescences, filling up or even extending beyond the textures which they destroy; and they thus impoverish and infect the fluids, and exhaust organic nervous or vital power. (*See arts. CANCER, § 11, et seq., and DISEASE, § 151, et seq.*)

78. B. The growth of scirrhus-cancer is merely the extension of the fibrous tissue, cancer-cells, and nuclei above described (§ 41, *et seq.*). The old cell-walls dissolve or break down, and the included new cells and nuclei are liberated, and give rise to others in turn. For this purpose, however, a certain amount of blastema is requisite. "This is obtained at first from the original exudation poured out; but, after a time, as the fibrous tissue increases, new vessels are formed in it, which continue to furnish materials for the new growth, in the same manner as the old vessels furnish materials of growth to the old tissues." A pre-existing tissue exerts much power over new formations in its substance or immediate vicinity; and hence, when a bone is fractured, the matter exuded is transformed into bone; and other tissues are restored when divided by a texture analogous to the one injured. "Very compound tissues, as the skin, lungs, muscle, &c., are never completely restored, but a cicatrix is formed, composed of fibrous tissue. On the other hand, epithelial and epidermic structures are easily restored and reformed, and so are all textures which wholly consist of cells. Hence the more

a cancerous growth abounds in cells, the more rapidly it grows, and the greater is its power of re-development." Some pathologists suppose that this power depends upon pre-existing and permanent nuclei, or germinal centres. But as to the truth of this, Dr. BENNETT does not inquire, considering it sufficient to know—what, however, was sufficiently known before histology came into vogue—"that a tissue once formed and furnished with blood-vessels possesses the property of growth; that is, of exerting a species of selective vital attraction on the blood, whereby such matters are transuded through the capillaries as are readily transformed into a substance like itself." But this act of growth, which I believe to be correctly attributed to vitality, the sect of chemical pathologists would consider as altogether chemical; while another sect would consider it as simply one of endosmosis. Of the more prominent features of the growth of cancer, and of the extension of the malady and contamination of the circulation, I have nothing to add to what has already been stated in the articles CANCER and FUNGOID DISEASE.

79. C. Is Cancer contagious? This question has been answered in the negative by some, and in the affirmative by others. Inoculation has even been resorted to in order to test the fact.—(a) The negative evidence is chiefly the following. Dr. WALSHE says that he has known women afflicted with advanced cancer of the uterus take refuge in hospitals from the importunities of their husbands, and that these men were perfectly free, according to the assurance of their wives, from ulceration of any kind. Dr. BENNETT states that his hands, more than once, have been immersed in the creamy fluid of encephaloma, while recent scratches have been upon them, without the slightest irritation having resulted. VOGEL states that he injected fresh cancer-cells from a tumour into the blood-vessels of a dog, without any morbid change being manifest eight months afterward. GLUGER has also been unsuccessful in his attempts to inoculate the disease.

80. (b) The affirmative evidence is chiefly the following: LANGENBECH injected the fluid from a cancerous tumour, while still warm, into the blood-vessels of a dog, with the effect of inducing secondary cancerous formations in the lungs of the animal. Dr. WATSON states that he has known two cases of cancer of the penis in men, whose wives were afflicted with cancer of the uterus. Some years ago, a patient was attended by Mr. MAYO and myself who was the subject of carcinoma of the penis and inguinal glands, and who soon afterward died of the disease. The malady had commenced in the glans penis, and he had infected his wife, who was found on examination with open cancer of the os uteri; and she died of the disease a considerable time after her husband. In this case there was no doubt of the husband having infected the wife, owing to the morbid matter from the ulcerated glans penis having been left in undisturbed contact with the os uteri. Mr. MAYO informed me that he had met with another case altogether similar to this. Dr. BENNETT asks if the cases to which Dr. WATSON has alluded were proved to have been cancer by a microscopic examination? But he has already shown that such examination adds but

little to the diagnosis of cancer; and it is well known that the majority of cases of open cancer, as these were, are so obvious as not to be mistaken even by the most inexperienced. Dr. BENNETT concludes that it is certainly opposed to experience that cancer can be communicated by contact or inoculation. I believe, however, that it can be so communicated, if circumstances favour the communication, more especially if the recent discharge from a cancerous ulcer is brought into, and remains for some time in undisturbed contact with a mucous surface, or part denuded of its cuticle.

81. *D. Degeneration of cancerous and canceroid growths.*—Dr. BENNETT remarks, that it is with the life of a cell as with that of the most highly organized individual: "It has its origin and birth, it gradually increases until it reaches maturity, then declines or degenerates until it has ceased to exist. The individual elements of a cancerous growth, like those of the healthy tissues of the body, are continually undergoing this process; like them, it leaves germs which continue to regulate its growth so long as they receive nourishment, and thus the structure, as a whole, is perpetuated. Sometimes this process receives a check from the cells, which are the entire agents of growth, being rendered abortive, and the result may be, 1st. A fibrous cicatrix; 2d. A fatty mass; or, 3d. A calcareous concretion."—(*Op. cit.*, p. 210.)

82. (a) It has been stated above (§ 78) that the cell-wall of the cancer-cell dissolves and breaks down, and thus liberates the young cells. This is the natural completion of individual cell-life. It has been shown that the increase of cells is dependent upon a due supply of blastema, in order to supply the materials of assimilation. Several cases are known, and one has come under my own especial and prolonged observation, when a cancerous ulcer has undergone the same changes as a simple ulcer; the cancer-cells in the one and the pus-cells in the other becoming gradually less in number, while the *fibrous element* has increased and terminated in the formation of a cicatrix. Dr. WALSH has adduced several instances of this transformation; and Dr. BENNETT thinks that this is a more frequent occurrence than is generally supposed. The only question is whether the pre-existing morbid growth was actually cancerous or not; but the local appearances and sensations, and the constitutional symptoms, have certainly been such, in rare cases, as warranted the inference that the growth was actually malignant. This writer states that Dr. BOCHDALEK, of Prague, has met with instances of cancer of the liver, in which the diseased structure broke down into a cream-like matter, the fluid parts being absorbed, and the whole shrinking together, forming a puckering on the surface often corresponding to a fibrous mass, or a fatty material, in which collapsed cancer-cells may be detected.

83. (b) It has been stated above (§ 14) that the cancer-cell may be rendered abortive by the deposition of fat-granules between the nucleus and cell-wall, and by their pressure upon the former, and the ultimate disintegration of the whole body into numerous fatty molecules and granules. "This is a very common termination of the life of individual cancer-cells; and, when the process is carried on to any great ex-

tent, the fat granules often collect in masses, and mingle with old cells, which exhibit various stages of their retrograde progress, and old nuclei, which have more or less resisted disintegration, are at length observable to the naked eye. In this manner the yellow masses, and yellow reticulated appearance in certain cancerous growths of some standing are produced—an occurrence so common that MÜLLER described it as a particular form of the disease, under the name of *cancer reticulare*" (p. 212).

84. Professor BENNETT, H. MECKEL, and VIRCOW agree in describing the reticulum of MÜLLER as disintegrated cancer, or as composed of broken-down cancer-cells, the nuclei of which sometimes remain; at other times the whole has undergone the fatty transformation, and been converted into compound granular cells; and not infrequently, in the last stage of the process, nothing but molecules and granules can be discovered. Dr. BENNETT considers that this change is not a proof of so-called secondary inflammation of the growth, as is supposed by WALSH, ROKITANSKI, and LEBERT; but that it is the same transformation that occurs in all old exudations, and in various organs where pre-existing cells undergo the fatty transformation, as in the liver, to constitute fatty liver, the kidney, to form BRIGHT'S disease, &c. The matter forming the reticulum occurs in *two forms*. In one it is seen in the fresh-cut surface, scattered throughout the growth, in the form of a net-work, more thick, however, and abundant in some places than in others. In the second form it forms masses of a bright yellow or orange colour, occasionally resembling tubercle, more or less friable, and of cheesy consistence. In the former compound granular corpuscles are most common; in the latter, irregular bodies, resembling tubercle-corpuscles, resulting from alteration in the form of the nucleus, after the cell wall has been broken down. These are called bodies of the reticulum by BRUCH. Compound granular cells are very common in cancer, and are to be considered as evidences of the cancer-cell. The greater their number and agglomeration, the greater the degeneration. The fatty degeneration is rarely uniform throughout a cancerous growth; commonly, while one part is converted into a fatty net-work, another is only partially so changed. This accounts for cancer having such a tendency to spread to other tissues, and for the destruction of one part being rarely attended by the reduction of the whole mass. Sometimes, however, the fatty degeneration is associated with the fibrous degeneration (§ 82), and extends to the whole morbid structure; and it may then be farther associated with an early stage of the calcareous transformation next to be mentioned.—(BENNETT.)

85. (c) A cancerous growth may degenerate into an accumulation of the *earthy matters* originally contained in the exuded matter. This form of cancerous degeneration is analogous to that sometimes observed in tuberculous formations. The cells break down, the more fluid and soft parts are absorbed, and the mineral parts are left concentered in the form of a calcareous mass or masses, of various sizes and shapes. This degeneration of cancer is very rare. Dr. WALSH appears not to have met with it; although he mentions the bony lamel-

læ, which are continuous with part of the skeleton, and which characterize certain cancers connected with the osseous structure. Dr. BENNETT has, however, observed it in two instances. In one he observed mineral masses mingled with broken-down cancer-cells in the mesenteric and epigastric glands, "some of which felt hard from calcareous depositions; others were infiltrated with a putty-like substance; and a few were composed of an external shell of hard, calcareous matter; while their interior consisted of a semifluid, gritty, diffuent material, which flowed out on breaking them."

86. (d) The three kinds of degeneration of cancerous growths may be variously associated in retrograde cancer; these may be the fibro-fatty degeneration, with either element in excess, or one or both these conjoined, with the accumulation of mineral matters in smaller or greater masses. In these cases there is generally a loss of substance, occasioning a sinking inward, with puckering of the adjoining surface. These changes occur only in cancerous growths of considerable duration, without ulceration or the formation of a cicatrix, as observed in the mamma when the nipple is retracted, and in the surface of some cancerous tumours. VIRCHOW ascribes the central depression in the white encephaloid masses of the liver to this cause. Dr. BENNETT views the stellate puckering on the surface of cancerous growths as far from uncommon; and certainly, when this appearance exists, there must necessarily be loss of substance and contraction of surrounding tissues; and these changes can only result from a partial degeneration of the morbid structure, more especially of the older parts of it, although an extension of it to adjoining parts may actually be proceeding. I may, therefore, conclude, with the writer just mentioned, that cancer may undergo transformations, tending in very rare cases to a spontaneous cure; and that these transformations are into a fatty or a calcareous matter—that the morbid growth is checked, and that it consequently shrivels up, some of the softer parts being absorbed, the rest remaining inert. The contraction of the surrounding parts in these cases, and the fibrous stroma of the cancer, constitute the puckering and cicatrices observed as evidences of a cure. Dr. BENNETT considers that the facts which he has adduced are unequivocal proofs that a cancerous growth may undergo spontaneous cure. In the case of a lady nearly related to, and almost constantly under the observation of the author, a cure certainly took place without any local treatment, the constitutional means about to be mentioned (§ 122, 123) having been assiduously employed.

87. ii. THE PATHOLOGICAL RELATIONS OF OTHER GROWTHS.—This subject has been noticed, as to most of what is known respecting it, when describing the anatomy of non-cancerous tumours, and in the article DISEASE (§ 110). Fibrous, epithelial, cartilaginous, and fatty growths, or those formations which are not adventitious as respects the economy (*sec* DISEASE, § 111, *et seq.*), may be ascribed to an error in nutrition, or to a hypertrophy or excessive deposition or nutrition of these several structures in the parts in which they occur. The cause of their origin and development is not known, although certain circumstances connected with their formation have been noticed.

But why either of these formations should occur in preference to the others, we are ignorant. Certain of them may be caused by an injury of, followed by increased exudation into a part, the exuded fluid undergoing changes favouring some form of nutrition in preference to others; but the same kind of tumour may occur without any such or any manifest cause. Tumours may form in the ovaria, or even in the substance of the uterus, or rather within the ducts and uterus, owing to an imperfectly developed or an unimpregnated ovum, detached partially or altogether, and arrested in either of these situations, sexual excitement having been imperfectly gratified or insufficiently developed. Other morbid growths are to be ascribed to an original constitutional vice, as the scrofulous and tubercular; and some are more or less dependent upon a constitutional predisposition acquired at an antecedent period, as the sarcomatous, fatty, and some others described above.

88. A. May morbid growths, not originally scirrhous or cancerous, be transformed into either of the forms of cancer? This question has been differently answered. As respects certain tumours or growths, as the tubercular and enchondromatous, no such transformations take place; but as regards some others, the change is possible, although not demonstrated. Dr. BENNETT remarks, that growths furnished with blood-vessels, such as the fibro-nuclear, epithelial, and fatty, may possibly be so changed, although it would be difficult to establish the change. But with respect to fibrous growths, the result of a simple exudation, or hypertrophy, at first of purely local origin, its occurrence seems to him to be absolutely proved. "According to LEBERT, inflammation (simple exudation), tubercle, and cancer are separated by distinct characters, originate from separate blastemata from the first, and never pass into each other. In this opinion, I think, he proceeds too far; for why may not a cancerous exudation be formed into the filaments of a vascular, fibrous, or fatty tumour, as well as among the filaments of the normal areolar tissue of the body? We are continually meeting with cases where a blow or injury on a part producing a swelling with the ordinary symptoms of inflammation is, after a time, followed by cancer. An indolent tumour may exist for years, and then suddenly assume the characters of cancer. Are we to suppose that such a tumour was composed of fibres and cancer-cells from the first, and that the growth of the latter had remained stationary all that time; or that nothing but a fibrous tumour existed at first, in which cancer-cells were afterward formed? The latter appears the most reasonable proposition"* (p. 217).

89. B. The enlargement of growths takes place from blood-vessels, which either permeate the mass or supply only portions of it, or reach to a greater or less extent of its surface. "In the first the growth is said to enlarge by intussus-

* I have, in the foregoing pages, been much indebted to the work of Professor BENNETT on "*Cancerous and Canceroid Growths*"; but I have been unable to adduce more than a part only of his researches. His numerous and interesting cases, his careful microscopic examinations, and his graphic illustrations, should not merely be perused, but carefully studied, by every physician and surgeon, in connexion with his lucid descriptions of each kind of morbid growths, as exhibited in the pages of his very original and able work.

ception; in the third by pure imbibition; in the second by both means. These distinctions are less important than they on first view seem; the perfect nutrition of the extra-vascular natural tissues proves, as a general fact, the vigour and efficacy of the imbibition process; and, in truth, imbibition is at play in all nutritions; for the nutrient elements of vascular tissues must be imbibed through the coats of their vessels, and it may be in addition through a stratum of cells. Enlargement by intussusception differs, therefore, from that by imbibition, in degree rather than in kind. In whichever way conveyed to the seat of growth-formation, the nutrient material, at first fluid, is *evolved and appropriated* by continuous cell-generation. Now this cell-generation may be affected on an *endogenous* or an *exogenous* plan. When the plan is endogenous, the germs of young cells are evolved and contained within older ones; those secondary cells are endowed with a similar procreative faculty; the tertiary series are in like manner secund, and so on. Here a single cell may be regarded as the *potential embryo of an entire growth*. When, on the other hand, the plan is exogenous, the germs of new cells are not found within, but lie and are evolved outside old ones."

90. "Where endogenous evolution prevails, and a cell is, potentially considered, a tumour in futuro, the perpetual production of similar cells is easily intelligible; the offspring that follows is as the parent that went before. But in exogenous growths the continuous germination of infinite series of like cells is not readily conceived. It may be surmised that, when a series of cells has sprung into being, this series acts on the evolution of succeeding ones, as a natural vascularized is known to do on the generation of epithelium-cells; the formed series so influences newly-exuded blastema (of which it constantly excites the accession), that this shall produce a new series of cells similar to itself. But, however the perpetuation of like cells be understood, be it remembered that the thing itself has its limits; for deposits may appear in growths, pseudo-tissues are among their frequent constituents, and a growth of one kind may establish itself a nidus within the area of another generically dissimilar. Elder cells thus seem (within certain limits) to cause the increase, and regulate the qualities of younger ones. Younger cells are, on the other hand, more or less active agents in effecting the destruction of the older ones; less so in endogenous growths, where the elder may increase materially in size (as their contained brood multiplies), and acquire thickened walls; more so in exogenous growths, where such enlargement of cells is not witnessed, and where the production of young is coeval with the disintegration of old ones."—(Dr. WALSH, *art. PRODUCTS, ADVENTITIOUS*, in *Cyclop. of Anat. and Physiol.*, vol. iv., p. 120.)

91. *C. The reproduction of growths or tumours* is of importance as regards the diagnosis as well as the treatment. Dr. WALSH, in his very able article just quoted, observes, that "growths of all descriptions are liable, when removed spontaneously or by art, to be *reproduced* in the spot they previously occupied, if the removal have not been absolutely complete. The particles left behind act as attractive forces for new

blastema convertible into cells, similar to those of which themselves are composed. This mode of reproduction (as it is erroneously called, for it is nothing more than enlargement, facilitated by removal of pressure of pre-existing substance) occurs with growths of all kinds, cancerous, sarcomatous, fibrous, fatty, enchondromatous, erectile, &c. But it would appear that in some cases of surgical removal, when the whole mass has, as is presumed, been extirpated, a new growth vegetates in its place. The difference of the cases is often rather apparent than real; we have distinctly found the germina of cancer in tissue, reputed healthy, surrounding a cancerous mass; and it is manifest that such germina, though invisible to the naked eye, may, quite as readily as a fragment of diseased tissue of even considerable size, act as the efficient agents of new development. When, independently of this mode of generation, the disease returns in the seat of its former growth, the occurrence must depend upon the continuance of that depraved state of the blood which is fitted to supply the necessary blastema, and likewise, possibly, upon some peculiar state of vessels of the part favouring its exudation here rather than elsewhere" (p. 121). That the blood and blood-vessels are thus more or less concerned in the re-development of morbid growths may be admitted; but something, if not more, should be imputed to the depraved influence of the organic nerves supplying these vessels and the part affected. (*See art. CANCER*, § 26.)

92. In cases where the growth appears in one or more places remote from its primary seat, Dr. WALSH remarks that the occurrence, which is termed the "distant reproduction" of the growth, is explicable in two ways. "The newly-discovered growth may have existed previously to the extirpation of the old one, and, having simply acquired additional activity, so become obvious, after that extirpation; or the new growth may have really first appeared subsequently to the removal of the older one." The latter alternative Dr. WALSH believes to be rare. There is, however, reason to consider it to be more frequent than he admits, and to be produced not merely in the way which he states, although that way certainly exists to a certain extent. Of this consecutive production of the morbid structure in distant parts, he considers the simple explanation to be that the vitiated state of the blood, proper for the supply of the necessary blastema, continues; and that this blastema is poured out in some other part of the frame, the original tumour no longer existing to attract its deposition within or around itself. That this explanation may hold good, either altogether or in part, I shall not here dispute; but the organic nervous influence, controlling, as it does, the functions of assimilation, nutrition, depuration, and excretion, certainly has a primary, and by no means a small share throughout, in the distant reproduction and extension of cancerous and other tumours.

93. *D. The changes produced in tumours during their evolution* may be viewed as departures from the regular processes of their formation. The most important of these changes are their degeneration, which has been considered as regards cancer, and the removal or conversion of some of the non-canceroid, spontaneously, or by

the aid of internal means. These, however, are only rare occurrences. Much more frequently morbid growths experience the principal diseased actions to which the natural or healthy structures are liable, as congestion, infiltrations of serum or of blood, hæmorrhage, inflammation, gangrene, depositions of matters foreign to their nature; and, as consequences of these, various discolorations and changes in consistence.

94. *E. The effects produced by tumours* and other morbid productions upon surrounding structures are most important, the injuries produced by them in many instances being chiefly of this kind. These effects are *mechanical* and *vital*. (WALSHE.)—(a) *The mechanical effects* are principally pressure, displacements, detrusion or extrusion, condensation, discoloration, infiltrations, interrupted circulation, occlusion of natural cavities or canals. When tumours form between muscular or movable parts and the membrane covering these parts, they generally are detrued from the original seats of formation, and, as they increase, they present stalks or peduncles by which they are attached to these seats, as most commonly shown by tumours in the uterus, which, assuming this shape from detrusion, and often subsequently from extrusion beyond the cavity of the organ, have been improperly called polypus.

95. (b) *The vital effects* of tumours on the surrounding tissues are softening or rarefaction, atrophy, hypertrophy, inflammation and its usual results, as adhesion, induration, ulceration, mortification, perforation; changes in the blood-vessels; hæmorrhages; alterations of the sensibility, from numbness to the most intense pain; and infiltration of the surrounding textures with matter similar to that composing the morbid growth—an effect observed chiefly in respect of cancerous tumours. Dr. WALSHE considers this last effect to occur in connexion with no other growth except cancer, and to constitute one of the most evident distinctions between cancerous and other allied formations.

96. iii. *THE SEATS OR LOCALIZATIONS OF TUMOURS AND MORBID FORMATIONS*.—A. Certain tissues and organs are much more liable to be the seats of growths than others, more especially the cellular tissue, and the female sexual organs. Dr. WALSHE observes that, while cellular tissue is the favourite site of growths, fibrous textures but rarely afford them a nidus. The mammae, the ovaries, and the uterus are frequent sufferers; the lungs and brain are much more rarely affected. Certain parts of organs, also, are much more commonly attacked than other parts, as the pylorus and the epididymis, than the rest of the organs. Some organs, or parts of organs, are prone to be affected by certain growths in preference to others, as the mammae, the stomach, the liver, &c., are most liable to be affected by cancerous productions; the bones to enchondroma; the neck of the uterus to cancer, in preference to the body of the organ, where fibrous tumours are chiefly developed; and the large intestines are very much more frequently the seat of cancer than the small.

97. *B. Sex* influences the site of growths. The female sexual organs are much more frequently their seats than the male organs; while the male urinary organs, especially the kidneys,

are more frequently thus affected than the urinary organs of the female. *Age* has also considerable influence, certain epochs of life favouring the development of certain growths in preference to others. Some tumours often appear to be compatible, and others incompatible, with the coexistence of others. Dr. WALSHE remarks, that some growths, as cystoma and carcinoma, are sufficiently prone to appear in the same person; others, as fibroma and carcinoma, are rare coexistences; none is actually incompatible, either as unconnected coexistences, or as developments in each other.

98. *C. The course* of tumours, or other morbid growths, topographically, is either *solitary*, *secondary*, or *multiplied*.—(a) A tumour may remain solitary until the death of the person in whom it exists, no other organ or tissue than that in which it commenced being involved by similar disease. This occurs chiefly in respect of enchondroma, of cystoid tumours, and occasionally of fibrous growths.

(b) *Secondary* growths arise by the spreading of the morbid structure from its original site to parts either *adjoining* or at a *distance*.—(1.) *Adjucent parts* are *secondarily* affected by infiltration or imbibition of the morbid matter from the site of preceding disease, a morbid mass thus gradually extending from the primary seat to circumjacent tissues, and co-ordinately enlarging.—(2.) *Secondary* growths in *distant parts* are produced by the transmission of the morbid matter by either the lymphatic or vascular systems. The matter, especially of cancerous and tuberculous growths, may sometimes be traced in the lymphatic vessels; and a lymphatic gland, in connexion with a cancerous mass, not infrequently becomes cancerous also; and, although the morbid matter cannot always be detected in the communicating vessels, there can be slight reason to doubt this mode of transmission. These glands may, however, be secondarily attacked, independently of this transmission of the cancerous matter; but this can rarely be the case where the vessels proceed from the primary site to the secondarily affected glands, and, as transmission is demonstrated in some cases, it may occur in all. When parts far distant are secondarily affected, these parts manifesting no lymphatic connexions, then it may be inferred that the secondary growth has either originated independently of the primary one, or been produced by the transmission of the morbid matter from it through the medium of the veins, in which cancerous as well as other morbid matters proceeding from the primary seats of disease have been detected. (*See arts. ABSORPTION AND ABSCESS, SECONDARY.*)

99. (c) *Multiplied* growths may exist primarily and independently of the transmission by the lymphatics or veins of morbid matters from pre-existing growths. The disease in distant and unconnected parts results from the constitutional morbid condition which thus manifests itself in sundry situations. This circumstance is often observed in cancerous and tuberculous maladies, and in cases of fibrous growths; and of cancerous diseases, the encephaloid or fungo-hæmatoid the most frequently manifests a multiplied origin.

100. *V. DIAGNOSIS OF SCIRRHOUS AND OTHER MORBID GROWTHS*.—The most important point of this part of the subject is the distinction be-

tween tumours or growths which are truly cancerous, and those which possess a different structure, although resembling the former. Histologists consider that "the local symptoms, and the general signs observed in individual cases, have been found insufficient; such as the lancinating pains, unequal surface, hardness, elastic feel, softening, ulceration, the surrounding tissue being affected, a general alteration of the constitution and return after excision," and have been, at various times, absent in cases undoubtedly cancerous, while they have existed in growths the nature of which is doubtful, and often been connected with epidermic, fibrous, fatty, or cystic tumours of the most innocent nature. That this difficulty exists in rare cases; that the symptoms and signs of cancer have been absent in truly cancerous diseases, and have existed in cases of an innocent nature, may be admitted to have occurred in rare instances; but these have not—at least rarely or never—furnished opportunities of examining the morbid growths microscopically until both diagnosis and treatment have been equally of no avail, or even until they have come under the knife of the anatomist. And even were opportunities of microscopic investigation afforded, it is manifest, from what is above stated (§ 5, 6), and from what has been advanced by the ablest histologists, that the diagnosis is by no means easy, even by the aid of the microscope. But I shall allow Dr. BENNETT to state the case in favour of this instrument.

101. "Symptoms alone, however, from their very nature, are apt to mislead, caused as they are by a variety of disorders which may affect an organ; while physical signs, once established and ascertained, are in conjunction with those of universal value. The only physical proof we can arrive at of the existence of cancer is by means of the microscope; not that this instrument is in itself capable, even in the most expert hands, of doing anything; but, conjoined with a knowledge of symptoms, progress of the case, form and appearance of the morbid growth, it offers us an additional and most valuable means of prosecuting our inquiries. It is from an union of these circumstances, combined with a minute examination of the growth, under such magnifying powers as will clearly display its cells and other primary elements, that we ought to found a diagnosis, and not from one or the other separately" (p. 222). It is evident, however, from the admissions of MÜLLER and others, and even from what has been stated by Professor BENNETT, that the microscopic history of morbid structures is only in its infancy; that there still remains much to be known respecting it; and that the connexions subsisting between vital power, vascular action, and morbid growths—connexions of the utmost importance to the physician, in a therapeutical point of view especially—have been generally overlooked; while there has been much difference in the information furnished by those who have professed themselves to be observers, gifted with the greatest powers of microscopic research.

102. *A. The diagnosis of cancer by means of the microscope*, as already stated (§ 100, 101), can seldom be determined until the disease has advanced so far as to become quite manifest without this aid. Dr. BENNETT remarks, that

wherever we see, in a morbid growth, cells including other cells, there can be no doubt of its cancerous nature; and that it is not by fixing attention on any one particular cell that we can discover a marked difference between it and a variety of others, but when grouped together we observe in different cells a variety in size and shape, some containing one nucleus, others two or three, and rarely more, and the nucleus containing one or two nucleoli. Such a group of cells is distinguished, 1st. From groups of epithelial-cells; 2d. From fibro-plastic cells; 3d. From pus and plastic cells; 4th. From compound granular cells; and, 5th. From fat-cells. The difference of the cancer-cells from cartilage-cells is also easily ascertained before softening, but after softening the diagnosis is more difficult; but even in this latter case, the action of water and acetic acid on the cells, and an examination of different sections of the growth, will assist the diagnosis. In all cases, the situation and characters of the tumours, and the concomitant circumstances and symptoms, should be taken into account. Open sores, the ulcers formed on the tongue, lips, or faces on the genitals and os uteri, furnish the best occasions for microscopic diagnosis during the life of the patient; and even in these situations many difficulties will often occur.*

103. It is interesting to add what Professor WALSHE has stated respecting this important matter. "A constant and unfailing microscopical characteristic of cancer has hitherto been vainly sought for; the following propositions will serve as a commentary on, and, in some sort, a justification of, the statement. (1.) Parent-cells, containing within them sub-cells having darker nuclei, and these, in turn, bright nucleoli, are strongly characteristic of cancer; but such cells are rare in, and may be altogether absent from, scirrhus; encephaloid, in some phases of its growth, may also be without them. (2.) The shapelessly caudate-cell seems significant of cancer; but it may be absent from encephaloid, and it is excessively rare in scirrhus and colloid. (3.) A tumour may present to the naked eye, the characters of encephaloid, be the seat of interstitial hæmorrhage, affect the communicating lymphatic glands, run in all respects the course of cancer, and nevertheless contain no cells but such as are undistinguishable, in the present state of our knowledge, from common exudation-cells. (4.) Nay, more, while a primary "malignant" tumour alone contains these cells, the lymphatic glands secondarily affected may contain compound nucleated-cells, spherical and shapelessly caudate. (5.) The granular and imperfectly nucleated cell of scirrhus is valueless as an evidence of cancer. (6.) The true fusiform cell is an adventitious formation when it occurs in cancer, and has no diagnostic signification. (7.) The association of fibre and cell-structure, which will distinguish scirrhus from fibrous tumour, may be totally wanting in encephaloid, and it exists in sarcoma and enchondroma. (8.) If fat be associated

[* M. LEBERT states that the type of the cancer-cell is a small regular sphere with an elliptical nucleus, occupying about half of the interior of the cell, and containing one or more nucleoli, but that this type is not often pure; the cellular envelope takes the ovoid, triangular, heart, and caudate shape. In no other cell do we observe the multifariousness of the cell-wall to the same degree. The nucleus is the constant element of the cancer-cell.]

in large quantity with fibre and cell-structure, the certainty that cancer is present becomes great, but not absolute.

104. "The property of infiltration, which serves well to distinguish cancer from other growths nosologically, fails practically in the distinction of tumours generally, because a true cancer is not necessarily infiltrated, and because tubercle and exudation-matter may be infiltrated. In ultimate analysis the single character least likely to deceive is this: if a tumour be cancerous, it will yield, on pressure, an opaque, whitish (milky or creamy-looking), albuminous fluid; if it be not cancerous, it will not yield a fluid of these qualities."—(*Cycl. of Anat. and Physiol.*, vol. iv., p. 137.)

105. *B. Fibro-nucleated tumours*, or growths, distinguished by the presence of fibres, among which are infiltrated naked nuclei, have hitherto been confounded with sarcomatous, encephalomatous, or osteo-medullary tumours. LEBERT considers this to be a peculiar form of fibro-plastic growth. Dr. BENNETT has observed but three or four instances of this tumour, and has viewed them as possessing marked peculiarities in structure, although presenting most of the appearances of those growths with which this has been confounded.

106. *C. Epithelial growths* generally commence in an induration or wart upon the skin or mucous surfaces, and are harder in the former than on the latter. Occasionally they appear as cauliflower excrescences or condylomata, made up of elongated papillæ aggregated together, with their summits more or less flattened. In this condition their diagnosis is easy. Sometimes they soften externally sooner or later after their formation, and become covered with crusts of inspissated pus and epithelium. "This crust, on separation, leaves an ulcerated surface, presenting irregular clefts between the hypertrophied papillæ, the edge being everted, and the base and margin greatly indurated. The ulcer may slowly spread over a considerable portion of the surface, and cause great swelling of the lymphatic glands from the irritation produced. In this condition such ulcers are usually considered to be cancerous." But the progress of an ulcer commencing externally in warty excrescences, spreading laterally, slowly, and proceeding from without inward, is distinctly opposed to the progress of true cancer, which almost invariably is deep-seated at its commencement, produces ulceration consecutively by thinning of the integument, and throws out subsequently and rapidly fungoid masses. The progress of the case, the absence of cancer-cells, the microscopic appearance of the projecting papillæ, will establish the nature of the growth.

107. *D. Fibrous formations* cannot, at an early stage, be distinguished from scirrhous. Dr. BENNETT considers that at their commencement they are both identical, and remarks that experience is daily showing the truth of this statement; and that the distinctions between them insisted upon in surgical works are illusory. When a hard knot or induration follows a blow or injury, it may result from a simple exudation; but it may nevertheless become cancerous; although this conversion is much less likely to take place in a young than in a cachectic or aged person. When more ad-

vanced, fibrous tumours are distinguished by partial elasticity, smoothness, and regularity of surface, from the irregular nodosities and stony hardness of scirrhous, and the pulpy feel of encephaloma. But these symptoms are sometimes deceptive. So that at an advanced, as well as at an early stage, the diagnosis may be occasionally impossible. Dr. BENNETT advises a cautious use of the exploring needle and microscopic examination. When the latter can be obtained, the presence or absence of cancer-cells will decide the question. But the former, however cautiously employed, will often aggravate the local mischief, and prove of questionable utility as respects the results.

108. *E. Cartilaginous growths*, when occurring in the extremities connected with the bones, and surrounded by an osseous capsule, may readily be distinguished from cancer; but when they are deep-seated, covered by soft parts, and have no distinct bony capsule, their detection is very difficult. Enchondroma may thus be readily confounded with cancer of the bones, of which disease it presents all the general symptoms and signs; and, as already stated (§ 66, 67), if it be softened it is not easily separated from cancer by the aid of the microscope, even after excision. In doubtful cases, during life, a microscopic examination can be obtained only by means of the exploring needle, and even then it may be unsatisfactory. The progress of the growth is more distinctive, cancer of the bones being generally more rapid in its progress than enchondroma.

109. *F. Fatty Tumours*.—"Simple lipoma and most encysted fatty tumours are readily distinguished from cancer, the first by their lobulated, and the second by their rounded form, together with their doughy feeling and non-attachment to surrounding parts." A fatty growth may, however, assume all the symptoms and signs of encephaloma. SENILLOR excised a fatty tumour from a man aged forty-seven. The growth returned twice after removal, and was excised the third time. It was considered to be encephaloid, from the local and constitutional symptoms and its return; and yet, on a microscopic examination, it was shown to consist only of adipose and filamentous tissue, and a chemical analysis proved it to be almost entirely composed of fat.

110. *G. Tubercular growths* can rarely be confounded with cancer. They simulate it only when the glands are enlarged in youth, and at an age when cancer scarcely ever attacks the frame, unless in the form of encephaloma or fungo-hæmatoid cancer. "Undoubtedly many of the so-called cases of cancer in the young are softened tubercle. The nature of the growth may be suspected from its cheesy consistence and absence of cancerous juice; while the differences between tubercle and cancer corpuscles under the microscope are so great as to be unmistakable. The only danger is confounding tubercle with the reticulum of cancer, which it closely resembles, and is a mistake that a critical examination of all the concomitant circumstances will alone enable us to avoid."—(BENNETT, *Op. cit.*, p. 229.)

111. VI. PROGNOSIS OF SCIRRHUS AND OTHER GROWTHS.—i. *Of Scirrhous or Cancerous Formations*.—Little may be added at this place to what I have stated when treating of CANCER

(§ 11, *et seq.*) and FUNGOID DISEASE (§ 17)—A. MÜLLER considers that *growths which are truly cancerous* when extirpated invariably return, and are inevitably fatal. Dr. WALSHE observes, that "cancer is not, as a matter of absolute necessity, a fatal disease; but the number of recoveries is relatively so small that, practically speaking, they are almost without numerical value, and may be excluded from considerations." Professor BENNETT states, that he can no more agree with the modified statement of Dr. WALSHE than with the unqualified one of MÜLLER; and remarks, that the established recoveries may be small in number, but their numerical value is altogether unknown in the present state of science. He believes that a cancerous growth is for some time purely local; that indolent tumours exist in the female breast or elsewhere for years, without making progress, or causing much inconvenience, and after a certain time they often suddenly increase, and evince signs of malignancy; that a fibrous vascular tumour may exist, in the filamentous meshes of which a cancerous exudation may be afterward infiltrated, and that in this indolent state a tumour may often be discussed by suitable means, and, if excised, be permanently eradicated. These propositions may be conceded to Dr. BENNETT; they have been long received as practical doctrines, and long acted upon by both physicians and surgeons. Even when a growth has become undoubtedly cancerous, complete excision of it has been said to have been successful in a few instances; but still the actually cancerous nature of the tumour has not been satisfactorily established, for the histologists argue that it has not been determined by a sufficient microscopic examination. But even they admit, as stated above (§ 100, 101), that a microscopic investigation is not sufficient always to determine the fact; so that the imperfections which they impute to the infancy of the science may be admitted to belong to the nature of the subject—to the varying, ever-changing, and constitutional relations of these growths—to the alterations which take place in them under the influence of changes in the state of vital endowment and of vascular action, both of the growths themselves, and of the body in which they occur as parasitic or other productions. It is in vain to look for precise marks of demarkation, either in the diagnosis or in the prognosis, where none exists, and where every phase, grade, and form of morbid growth is observed, although in different cases; each of which phases and forms is continually undergoing farther changes, and assuming varying local and constitutional relations. The histologists, after all they have observed and written, leave the subject of prognosis, as well as that of diagnosis, pretty much in the state in which they found it; for one of the latest and best writers in this department has remarked, that "in the present state of our knowledge, there is no possibility of pronouncing accurately whether an operation will be successful or not"* (p. 232).

112. ii. *The prognosis of morbid growths which are not cancerous* depends chiefly upon their situation and nature, and has reference to the probability of removing them by medical treatment, or by surgical means. The growth may appear in a situation which precludes an operation, or in which an operation or simpler mechanical means would be extremely dangerous, and where a recourse to medicine, in order to arrest its progress or to remove it altogether, should be tried or chiefly confided in, although the chances of success from it may appear small. Adipose or fatty tumours, tubercular growths, and glandular enlargements, admit of a more favourable prognosis than others, and furnish the greatest number of chances of their removal by medical treatment. Dr. BENNETT remarks, with reference to operations for the removal of tumours, that "it is now well understood that not only cancerous, but the most innocent growths may return after excision. It is generally supposed, however, that in all such cases the second growth originates in some germ which had been left in the part. Hence it is of great importance to separate a recurrence in the seat of the former tumour from that occurring in other places and textures. The former is not necessarily to be dreaded. Numerous instances are on record of fatty, fibrous, and encysted growths returning again and again, and finally extirpated with success." Epithelial growths, also, occasionally return, but enchondroma, according to MÜLLER, does not. It should, however, be recollected that while truly cancerous growths generally return either in the same situation or elsewhere, non-cancerous tumours seldom return, even in the same situations, unless a portion be left behind, and when they return they appear not often in other parts. Warty and encysted growths may occur in several places; several fibrous tumours may exist in the body of the uterus; and neuroma may affect several nerves. Although cancer, after a time, extends itself to the lymphatic glands in the neighborhood, the affection of these glands is not to be received as a proof either of the cancerous nature of the primary growth or of a fatal tendency of the malady; for a non-cancerous growth may cause, but much more rarely, enlargement of these glands, owing to the amount of local irritation produced by it. When, however, this affection of the glands occurs, it indicates, even in non-scirrhus tumours, a much more serious malady, than when no such glandular affection is observed.

113. VII. TREATMENT OF SCIRRHUS AND OTHER TUMOURS.—i. *The treatment of scirrhus growths* I have considered fully in the article on CANCER (§ 27, *et seq.*); but there are a few topics which have been agitated since that was written, which require a brief notice at this place. The means which Dr. BENNETT advises for the "*retardation and resolution*" of cancer are *cold, dryness, pressure, and locality*; and these he views as the principal known measures by which we can hope to retard the pro-

* ["Cancer," says Dr. WARREN, "is not a specific disease. It has a variety of forms, of causes, and of habits of action. It is one thing in the tongue, another in the skin, another in the breast. There is nothing specific in it, unless we call its incurable disposition specific; but this it has in common with other diseases. Besides, can-

cer, though rarely cured, is not universally incurable. We see it disappear in various parts of the body without excision, though most rarely."—*Surg. Observations on Tumours*, &c., by JOHN C. WARREN, p. 351.]

duction and growth of cancer-cells. He remarks, that "a cancerous growth is a vascular structure, which consists of nucleated cells infiltrated among a fibrous stroma, and that its power of growth, extension, and redevelopment is dependent upon the amount of cells it contains. It follows, that to retard the growth of the cancer-cell when once formed, is to retard the advance of cancer itself, and that to render it unproductive is to arrest its progress." This view appears plausible at first sight, and the means proposed are to a certain extent appropriate to the pathological doctrine entertained; but it is questionable how far the doctrine is sound, and to what extent the means are beneficial. As to the former, if it be conceded that the formation of cancer-cells are the results of a low grade of vitality in the part—that cancer-cells, like hydatidic formations, are parasitic productions, proceeding from low grades of vital power and of vascular action, and, like all such productions, consequences of these states, the treatment here advised has reference merely to the morbid results, and has comparatively but little regard to the antecedent vital conditions, of which the cancer-cells can be viewed only as the products. In this instance, as in many others, the histologists would induce us to grapple with the morbid product, to the total disregard of the vital condition producing that product—to the entire neglect of those states of vital power and vascular action upon which all morbid growths depend, whether parasitic, hydatidic, cell-formations, or simple exudations.

114. Viewing, therefore, cancerous productions or growths as depending upon the causes, constitutional and local, which I have set forth in the article CANCER (§ 26)—entertaining the doctrine there stated, and knowing that it is supported by the ablest and most experienced writers and observers, as well as confirmed by my own experience, I firmly adhere to this doctrine, and to the *intentions of cure* set forth conformably with it in that article (§ 40, *et seq.*), believing that they are the best calculated to enable the constitution to resist the inroads of the malady, to prolong life, and to give the patient a chance of throwing off, or resolving the local evil. The measures which have more recently been advised should not, however, be passed over without notice, although but little evidence of benefit from them has hitherto been obtained. Dr. BENNETT observes, that "all eggs and young animals require warmth to favour their growth, and maturity is reached earlier in the tropics than in temperate regions. In the same manner, excessive cold, dryness, want of room, and unfavourable position are circumstances hostile to cell-development; but it requires no lengthy argument to prove the great influence of these agents on vital growth." Without disregarding this view of the subject, I would still insist upon the importance of the principle for which I have contended, both in the article CANCER (§ 26) and in that in HYDATIDS (§ 24), that these and all other parasitic formations increase and multiply in proportion as the parent animal becomes weakened, and as the secretions and excretions accumulate, and that those formations are most disposed to diminish and ultimately to disappear, with the full restoration of the vital power, and with the

healthy nutrition of the animal which produced them.

115. *A. Cold.*—Dr. BENNETT remarks respecting this agent, that "in a cancerous growth, the tendency of which is to excessive cell-formation, we evidently retard its advancement by the application of cold. Were it possible, indeed, to bring down the temperature of an entire growth below the vegetating point, we must inevitably kill it; but, supplied as it is with heat through the warm blood within, this is impracticable. Still, the external application of cold is one of the most powerful means we possess of retarding the progress of a cancerous or any other kind of growth." The beneficial agency of cold has, however, to be proved. If it be employed so as to promote and develop organic nervous energy and vital power, there can be no doubt of its proving more or less useful.

116. *B. Dryness.*—It has been supposed that, as the development of cell-formations depends upon a blastema or nourishing fluid, it follows that, if this were cut off, the growth would die. In order to accomplish this intention, it would be necessary to tie the principal vessels nourishing the growth. This has been done by MAGENDIE, JOBERT, and HOSSACK, with partial success in some instances, and with complete success in others; but it is doubtful whether or no the disease was cancerous in all the cases. Dr. HOSSACK applied a ligature on the carotid artery in two cases of scirrhus of the parotid gland. In one case the growth of the tumour was arrested, and the suffering of the patient relieved; in the other a complete cure was produced. Lotions and humid applications should be avoided, and those which produce a drying or absorbent, with an astringent, action ought to be preferred.

117. *C. Pressure* was first advised by YOUNG, and has since been adopted for the cure of CANCER (see § 37) by several writers. Pressure acts, 1st, by diminishing the supply of fluids to the morbid growths; 2d, by preventing the expansion and development of the cancer-cells; and, 3d, by promoting the disintegration and absorption of the morbid growth. Dr. BENNETT remarks, that "pressure applied externally to so-called cancerous tumours has been pretty extensively tried, and been found successful, sometimes in retarding, and at others in altogether removing them." TRAVERS has seen cases of this kind; and RECAMIER gives the following results of the practice tried in 100 cases. He says, of these, "sixteen appeared to be incurable, and underwent only a palliative treatment; thirty were completely cured by compression alone; and twenty-one derived considerable benefit from it; fifteen were radically cured by extirpation alone, or chiefly by extirpation and pressure combined; and six by compression and cauterization. In the thirteen remaining cases the disease resisted all the means employed." Dr. WALSH states, that Dr. A. R. J. BAYLE, out of 127 recorded cases, gives 71 cured, 26 improved, and 30 unaffected. These results are certainly much more favourable than could have been obtained from the treatment of the several kinds of scirrho-cancer; and I would therefore infer, either that the favourable results have been prematurely reported, or that cases actu-

ally not cancerous have been confounded with the cancerous.

118. Dr. NEIL ARNOTT has greatly facilitated the employment of pressure by the invention of an instrument for this purpose, and which has been described by Dr. WALSH. It consists of a spring, an air-cushion, supported by a flat resisting frame or shield, a pad, and two belts. It does not interfere with the movements of the thorax, and the amount of pressure can be nicely regulated and equably applied; causing great relief from pain, and restraining hemorrhage in ulcerated cases. It has been proved useful in cases in which I have seen it resorted to. Dr. BENNETT remarks, that, if pressure alone be capable of producing such good results, its conjunction with one or more of the other means capable of retarding growth may be attended by even greater utility; and thus the apparatus invented by Dr. J. ARNOTT, by means of which pressure may be combined with external cold and dryness, is directly indicated, and deserves to be tried; or his apparatus, applied when the patient is at rest, may be alternated with that of Dr. NEIL ARNOTT, when exercise is desirable. I believe, however, that pressure will be found most efficacious when conjoined with those measures which are the best calculated to improve the general health, and to enable the vital power to throw off the parasitic formation. (*See art. CANCER, § 40, et seq.*)

119. *D. Locality* has been shown, in the article CANCER, to have considerable influence in favouring the development of this malady. Cold, humid, and malarious situations, unwholesome food, insufficient nourishment, and mental anxieties and depression, are among the most influential causes of scirrhus-cancer. Therefore a choice of locality, and, with reference to season, prevailing winds, and exposure, should be made with due care; a dry, moderately warm, and bracing situation and air, being selected. A clay soil, or a low alluvial, wet, and swampy soil should be avoided, even to a considerable distance; and food, exercise, and the regimen of both the body and mind, should be such as are most calculated to give due tone to the former, to refresh and agreeably engage the latter; interesting occupations being calculated to promote both intentions, while the want of occupation leaves the patient a prey to ennui and to his own depressing anticipations, or his still more lowering fears.

120. *E. Excision.*—The propriety of excising tumours, from a belief in their cancerous nature, or dread of their assuming this nature, or as the best mode of removing them, has been much discussed by both physicians and surgeons, especially in recent times. It may have been supposed that the discoveries of the histologists would have gone far to determine the question of excision, in as far as the nature of the growth may be concerned. But they have left the matter pretty much in the same state as that in which they found it. Professor BENNETT, after alluding to the discussion on this subject, and the differences of opinion expressed by the most eminent surgeons of Paris, remarks, that “a knowledge of the structure and natural progress of cancerous and canceroid growths must in future exempt sur-

geons from the doubt and difficulty they formerly experienced. At the same time, it cannot be denied that considerable obscurity still hangs over our knowledge of the pathology of cancer, and that there are no means of diagnosing a cancerous from fibrous and other forms of canceroid growth at their commencement. It seems to me certain that a cancerous may supervene upon a canceroid growth, and that both for a time may be local, so that, under all circumstances, where the nature of the tumour is doubtful, after means of retardation and resolution have had a fair trial, excision should be at once had recourse to. As there is no possibility at early period of knowing whether the growth may or may not ultimately become cancerous, prudence demands that *as soon as it becomes evident that these means have failed to arrest its progress*, an operation should be performed. If early excision were more practiced, many of the lamentable cases which occur would never appear.”—(*Op. cit.*, p. 242.) This is sound advice; and the same eminent physician farther remarks: “The practical rule, then, which pathology and experience unite in causing us to adopt, seems to be this, *that so long as cancer remains fixed in a part which is capable of being removed, and the strength of the patient is not too much reduced, so long is the surgeon warranted to interfere.* If this applies to cancerous, it does with ten-fold force to canceroid growths, which, everything that we know warrants us in asserting, are much less fatal and malignant.”—(*Op. cit.*, p. 245.)

121. *F. Chemical Applications, &c.*—The destruction of morbid growths by various cauterizing or dissolving applications can scarcely be accomplished, unless at very early periods of their production; and, as regards cancerous formations, these applications would increase rather than arrest the disease. Dr. BENNETT remarks, that “Acetic acid dissolves the cell-wall more or less, and strong potash reduces the whole to a granular mass. The continued application of these agents, therefore, would tend to dissolve if brought in direct contact with the cells, and need not necessarily excite such irritation as to cause fresh exudation. The only objection is, the utter impossibility of affecting the whole mass, even in cases of ulceration, and preventing the formation of deep-seated cells, while the superficial ones are destroyed. In certain canceroid growths, especially epithelial ones, the application of acetic acid is an established remedy, and should always be tried when it is thought possible to bring the fluid successively in contact with the entire mass of the disease” (p. 250). The external application of the chloride of zinc has been advised, and of iodine, and of several of its preparations. Probably the application of an iodide of zinc may deserve a trial.

122. *G. Internal Remedies.*—Before excision is attempted, and often contemporaneously with a judicious recourse to external means, several internal remedies, either singly or variously conjoined, may be tried, more especially those which tend to promote the digestive, assimilative, and depurative functions, and to develop the powers of life. As respects cancerous growths, this principle of treatment has been fully insisted on (*see arts. CANCER, § 40, and FUNGOID DISEASE, § 21*); it therefore only

remains briefly to notice the importance of adopting it in our attempts to remove other morbid growths, especially before the constitution is subjected to the shock of an operation; and in cases where the situation of a tumour or other circumstances may render the success of an operation either extremely improbable or impossible. In three cases of large tumours—one seated superficially, evidently a fatty tumour, and about the size of a person's head, the others seated very deeply among the muscles of the upper half of the thigh—and in one case of tumour, apparently attached to the pericranium, a course of internal medicines entirely removed the disease. I had advised a recourse to surgical aid, but the patients having been desirous of trying medical treatment before any surgical means were adopted, a course of the medicines about to be mentioned was prescribed, very nearly the same substances having been employed for the four cases. Those cases occurred some years ago; but the persons who were the subjects of them had not, up to recent periods, experienced a return of these growths. The medicines which were prescribed consisted chiefly of the iodide of potassium, conjoined with solution of potash, the decoction or compound tincture of cinchona, the internal use of tar-water, and the fluid extract or other preparations of sarsaparilla, with due attention to diet and to exercise in the open air. When treating of CANCER (§ 34–41), the propriety of prescribing the preparations of iron was insisted upon, especially in such combinations as the peculiarities of the case would suggest; and the *iodide of iron* was then for the first time recommended in the treatment of cancerous diseases. This medicine has frequently been given by me in these maladies with sarsaparilla, or dissolved in the sirup of sarza, with more or less benefit; and the *nitro-hydrochloric acids* have been sometimes prescribed with vegetable tonics or bitter infusions. Considerable advantage has been derived, in several cases, from the use of inspissated *ox-gall*, as recommended in the first part of this work, and prescribed in numerous and varied formulæ in the APPENDIX which accompanied that part, more especially in correcting and promoting the functions of the digestive canal. *Conium*, and other narcotics formerly much praised for cancerous maladies, have rarely proved of advantage beyond the temporary relief to pain, or to other urgent symptoms they have sometimes afforded.

123. *H. Diet and Regimen.*—These require to be adapted to the temperament, diathesis, habit of body, and other circumstances of the patient, as well as to the presumed nature of the tumour. When treating of CANCER (§ 41), I mentioned the advantages generally derived from attention to the secretions and excretions, and from promotion of the primary and secondary assimilating processes. There can be no doubt of the good effects of moderate exercise in the open air, of a residence in a mild, dry atmosphere, and of pleasant occupations, with a cheerful state of mind. But the nature of the food admits of much more discussion. In the cancerous or scirrhus forms of morbid growth, the adoption of a farinaceous and vegetable diet has been advised by Dr. LAMBE and a few others. I have seen this diet most bene-

ficial in a case which was considered cancerous disease of the os and cervix uteri; but the patient enjoyed at the same time the advantages of removal to a good air, and her sanguine temperament and full habit of body favoured the change of diet. When, however, the patient is of the melancholic, lymphatic, or nervous temperature, or if anæmia or a cachectic habit of body be manifest, I believe that a judicious combination of animal with vegetable food, and the promotion of the assimilating and excreting functions, are most beneficial. In all cases of a malignant or contaminating nature, and in all cases which are likely to assume this nature, the chief indication of treatment is to enable the vital energy, by the aid of diet, air, and exercise, to resist the extension of the local evil, and to favour its transformation or resolution.

[According to WENDT, HELM, and others, the preparations of gold have been found very useful in scirrhus induration of the tongue. The usual form of administration is to rub them on the tongue. A case of scirrhus of the pylorus is related by H. HOFFMAN, in which the chloride of gold effected a perfect cure; and frictions of the *chloride*, as well as the *oxide*, on the labia pudendi, in cases of cancer of the uterus, have been recommended by HUFELAND, HERRMANN, MEISNER, GROTZNER, GOZZI, and others. KRIEMER advises that they be applied to the os uteri. According to German writers, scirrhosties have frequently been dispersed through their agency, and even in open cancer marked improvement has been perceptible.

Dr. A. T. THOMSON has described a case of *scirrhus mamma*, which, after protracted and fruitless treatment by other agents, as other preparations of iron, with conium, ultimately was cured by a combination of *iodide of iron and conium*.

The *Calendula officinalis*, garden marigold, has considerable reputation in Germany for the cure of scirrhus and cancer. WESTRING, a Swedish physician, called attention to it in 1817, having found it very useful in cancer of the breast and uterus. He used a decoction of it internally, and also applied the fresh plant to the part affected, when practicable, and it was found to allay the burning pain. RUDOLPH afterward used it with much benefit, in a case of induration of the mamma, in a young female, applying the acetate of iron in solution, at the same time, externally. FEHR also found it useful both in incipient and advanced scirrhus. STEIN praises it highly in cancer of the integuments, using an ointment made of the expressed juice of the young plant and flowers, with fresh butter, giving at the same time a decoction of the plant internally. The salve causes considerable pain at first, but in a little time the ichorous discharge is improved, the offensive odour corrected, and in from fourteen to twenty-one days the ulcer is converted into one of a benign and readily cicatrizable character.

Iodine is highly recommended in scirrhus of the uterus, mamma, &c., by HEIM, KLAPROTH, HENNEMANN, ULLMANN, HILL, MAGENDIE, WAGNER, ZIMMERMANN, and many other physicians, applying it in the form of the compound ointment to the part affected, and also giving it internally. MAGENDIE extols it in *cancer of the*

tongue, JAHN in incipient scirrhus of the stomach, while Dr. J. K. MITCHELL, of Philadelphia, has found the iodide of potassium afford very marked relief in a scirrhus tumour of the neck.—(*Medical Examiner*, 1846.) I have seen, also, decided benefit from the use of different preparations of iodine, particularly the *iodide of iron*, used both externally and internally, but I cannot say that I have witnessed any perfect cures from their employment.

The preparations of *platinum* have been recommended by DUTTENHOFFER, PREVOST, and others, in different forms of cancer and scirrhus, but I have not seen them employed, nor is there sufficient evidence in their favour to recommend them to our notice. I have more confidence in attention to the loss of health, as connected with proper food, exercise, pure air, suitable clothing, freedom from anxiety, &c., than in all the drugs of the Pharmacopœia. The late Dr. TWITCHELL, of New Hampshire, was cured of a cancer of the face by an exclusive *bread and milk* diet; and since his case was published in the journals, I have known several others in which the disease was arrested by the same diet and regimen, without the use of any remedies whatever.

There can be no doubt that early excision is in all cases advisable, where practicable, great care being taken to remove every portion of the scirrhus part. If this be done, they are not likely to return unless there be a strong hereditary tendency to the disease; in this case, however, excision is advisable, inasmuch as it tends to protract life, if it does not save the patient. There is danger that too much reliance be placed on the means of retardation and resolution, mentioned by our author, to the neglect of the more important and radical treatment. But we are not to forget that cancer, like scrofula, is often a constitutional disease, and that if there be any remedy for it, it must be found in agents which influence the intimate structure of the body more generally and intimately than any medicinal substance can do, as proper diet, a healthy state of the excretory apparatus, a pure atmosphere, and exercise of the muscular system, suited to the constitution of the patient.]

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SCROFULA AND TUBERCLES.—SYNON.

—*Struma*, Celsus, Pliny, Linnæus, Good. *Scrophula* (from *Scropha* or *Serofa*, a pig or sow), Sauvages, Vogel, Sagar, Cullen, Macbride, Darwin, Young. *Xopàs*, Hippocrates. *Scrophula*, Pinel. *Scrophulosis*, *Scrophulosus*, *Morbos*, *Vitium Scrophulosum*, Dunglison. *Cachexia Scrophulosa*, *Adenosis Scrophulosa*; *Glandes*, *Strumes*, *Ecroutes* (*Crucis*, Scotticæ),

Fr. *Kropf*, *Skropheln*, *Skrofelkrankheit*, Germ. *Scrofula*, *Scrofole*. Ital. *Scrofula*, the King's Evil, the Evil. External *Scrofula* or *Struma*. TUBERCLES.—*Tuberculum* (from tuber, a tumour); *Tuberculosis*, *Morbos tuberculosus*, *Strumosis*; *Cachexia tuberculosa*, *Dyscrasia tuberculosa*; *Diathesis seu Constitutio Strumosa*; *Tubercular* or *tuberculous Cachexy*, *Diathesis*, or *Vice*, &c.; *Internal Scrofula* or *Struma*.

CLASSIF.—3d Class, Cachectic Diseases.

3d Order, Impetiginous Affections (*Cullen*). 3d Class, Diseases of the Sanguineous Function. 4th Order, Cachexies (*Good*).—CLASS IV., ORDER I. (Author in Preface).

1. DEFINIT.—Constitutional asthenia; a weak or an atonic development of the frame, with a flabby state of the soft solids and predominance of cellular and lymphatic conformation; and a disposition to, or the presence of, swellings of the lymphatic glands, of disorder of the mucous surfaces, and of deposits, in various organs or parts, of small masses, varying in size, consisting of a firm, friable, inelastic substance resembling cheese, and denominated tubercles.

2. From the synonyms enumerated above, it may be inferred that the terms *Scrophulous diathesis*, or *cachexy*, or *vice*; *Strumous taint* or *constitution*; *Tuberculous cachexy* or *evil*, *Tuberculosis*, *Scrophulosis*, may be considered as nearly synonymous, although the scrophulous taint or cachexy may be viewed as sometimes existing without the tubercular deposit being yet formed, this deposit, in some one or more of its numerous seats or manifestations, being the common structural change resulting from this taint—resulting so generally as to render it doubtful whether or not this taint ever exists without the tubercular formation being present in some situation or other, either in a developed or in a rudimental and latent form. *Scrophulosis* and *Tuberculosis* will, therefore, be considered by me as nearly synonymous—as very nearly allied, if not identical morbid conditions; the former, however, being more frequently applied to the external manifestations of the constitutional taint or diathesis, the latter more generally to the internal structural changes. I am aware that this opinion is different from that supported by SCHÖNLEIN, SCHARLAN, DR. EVANS, MR. PHILLIPS, and M. LEGRAND; but I believe that their doctrine will, in this respect, be considered incorrect, after the consideration which will be given to it in the sequel. In discussing the subject of *Scrophula* and *Tubercles*, I shall follow this arrangement:

3. I. Of the *Scrophulous diathesis* or *taint*—Latent or inactive *Scrophula*; ii. The *Causes of Scrophula* and *Tubercles*; iii. The *Structure and Composition of Tubercles*; iv. The *Pathology of developed, open, or manifest Scrophula* and *Tuberculous*; v. The *Pathogenesis of Tubercles*; vi. The *Comparative Pathology of Tubercle*; vii. The *Scrophulous Taint as predisposing to, and influencing the Symptoms, Course, and Terminations of various diseases*; viii. *Diseases attack the Scrophulous diathesis, without being essentially scrophulous or tubercular, although more or less nearly allied to Scrophula*; ix. The *associated alterations and complications of Scrophula* and *Tuberculous*; x. The *prevention of Scrophula* and *Tubercles*; xi. The *Treatment of Scrophula* and *Tubercles*.

4. I. INDICATIONS OF THE SCROFULOUS DIATHESIS OR TAINT.—The *strumous* or *scrofulous taint* was no farther recognized by the ancients than in connexion with swollen external or lymphatic glands, the constitutional vice being overlooked until the writings of FERNEL, PLATER, BAILLOU, and others directed attention to a more correct pathology of the disease. More recently, numerous writers have furnished interesting information respecting strumous affections, especially HOFFMAN, HUBER, VAN SWIETEN, LALOUETTE, HUFELAND, and HECKER; and, in the present day, the writings of CARSWELL, GLOVER, PHILLIPS, BENNETT, WALSH, TYLER SMITH, and others, are especially deserving an attentive perusal. Dr. GLOVER very justly remarks, that “a careful distinction should be made between the scrofulous diathesis or predisposing constitution and the actual processes of the disease—between the *Ens in potentia* and the *Ens in actu*.” The scrofulous diathesis may, by the debility or the susceptibility accompanying it, predispose to other diseases besides those which are more strictly strumous or tuberculous; and a distinction should therefore be drawn between the latent or inactive scrofulous taint, the diseases which are not strictly attributable to this taint, and those maladies which are actually the structural manifestations of it. But is this distinction readily drawn? I believe not; and that the descriptions and distinctions adduced by HUFELAND, LLOYD, LUGOL, and many others, are so loose, and present so numerous exceptions, that they deserve, in many particulars, but little credence, and certainly some of them, at least, require a more particular investigation. Several of these have been subjected to a minute examination by Mr. PHILLIPS; but, as he considers tubercles to be distinct from scrofula, much of his reasoning on this subject fails in strictness of application to the subject in the wider signification which I have assigned to scrofula. M. LUGOL assigns so many indications of the scrofulous diathesis, and those with so little justice and precision, as to have it remarked that, of all his characters of this diathesis, there is not one which may not with equal value be replaced by a phenomenon diametrically opposed to it; yet this is one of the writers who is so much praised by the Gallic school in this country. Of the various indications of the scrofulous taint enumerated by this and other writers, many will appear to the experienced writer as possessed of little significance and dependence, and as deserving of very slight consideration.

5. *The chief characters of the scrofulous taint enumerated by writers are the following: (a)* A want of due bodily symmetry; small, weak, or crooked limbs; a gibbous or pigeon breast and flattened ribs; hare-lip (BREDOW); hypertrophy of the pubis, the sacrum, and the ischia (LUGOL).—*(b)* A certain character of the head and face: the jaws are said to be broad, the forehead low and angular, and the neck long and rounded; a head larger than natural, especially posteriorly; a puffed-up rounded visage; great transparency or whiteness of the skin, often with a rosy tint of the cheeks; “a pale, inflated countenance; the chief colour of the dark complexion is dull or dirty, of the fair an unnatural whiteness, frequently with an agree-

able redness of the cheeks; in others a waxy yellowness, with a dirty pallor round the mouth.”—(BREDOW). Bluish rings round the eyes; the eyes most frequently large, oftener blue than dark; the pupils are commonly large; the tunica albuginea of a pearly whiteness, traversed by injected blood-vessels, especially if the mesenteric glands are affected (HUFELAND), or of a bluish whiteness, and the pupils large when the lungs are diseased. The eyelids are often œdematous, the eyelashes are long, the Meibomian secretion is increased. The nose is wide or swollen, or red or shining; the upper lip is thick and projecting, and the furrow between it and the nose is deep. The general expression of the countenance indicates indolence and want of energy. The first teeth are small, and subject to caries. The second are broad, often covered by a glairy secretion, are very white, readily split, and often become carious.

6. *(c)* The appetite is irregular—sometimes impaired, at other times voracious; occasionally there is nausea; the tongue is often foul, the breath fetid or sour; the bowels are irregular; flatulent eructations are frequent and acid; and the excretions are also acid. The abdomen is large, tumid and flatulent on percussion. Discharges from the nose are common, and from the vagina not unfrequent. The soft solids are flabby; the adipose and cellular tissues abundant but soft, giving the surface of the body a full and rounded contour; the limbs are deficient in rigidity and firmness. The tendons are small and yielding; the capsules of the joints are weak; and the heads of the long bones are large. Hence a disposition to lateral curvatures of the spine, thick ankles and joints, large ill-formed hands and feet, and falling of the arches of the latter. The shoulders are high.

7. *(d)* According to HEUSINGER, one of the correctest writers on Pathology, the strumous taint consists of a torpid state of the nervous system. The blood, whose condition is yet but little known, appears to be from the commencement poor in globulin and hæmatin, rich in albumen, which, at a later period only, diminishes also. There are abundance of lymph, extension of the lymphatic vessels, marked development of the lymphatic glands, and predominance of the cellular system, not only under the skin, but in all the organs, where it commences to replace the specific tissues, which is especially apparent in the muscles, the bones, &c. All the mucous secretions are augmented, and they often become albuminous.

8. *(e)* General lassitude, languor, and debility are commonly experienced, with an inability to sustain prolonged physical and intellectual exertion. The powers of the mind, although generally feeble, are often precocious. Dr. GLOVER remarks, that in very few of the subjects which he had examined has he found the bodily or intellectual powers fairly developed in a degree proportionate to the age and circumstances of the patient, and that a general retardation of development seems one of the most constant features of this peculiarity of constitution. According to HUFELAND and FISCHER, the generative functions are early and powerfully manifested. They may be early and frequently, but certainly not powerfully exerted. LUGOL maintains that these functions in scrofulous subjects are below the average.

9. (f) All that is known of the *blood* of scrofulous persons has already been stated (§ 7). The *urine* has been described by SIMON and others to be usually very pale, unless vascular excitement be present. Its specific gravity is low, and in children it is more acid than usual. There are differences of opinion as to the nature of the free acid; some consider it phosphoric acid; others hydrochloric acid; and others, again, lactic acid. The urea and uric acid are often diminished, while the salts, especially the phosphates, are increased; and even oxalic acid—an acid foreign to normal urine—has been found in the urine of strumous children. According to SCHÖNLEIN, the chief alterations observable in the urine of scrofulous persons consist in the diminution of nitrogenous constituents—the urea and uric acid; and in the appearance of the non-nitrogenous oxalic acid, and more rarely of benzoic acid. The acids are frequently so abundant, that the urine, upon cooling, deposits copious sediments of the oxalates, and these sediments sometimes form renal and vesical calculi. The frequent occurrence of oxalate of lime or mulberry calculus in children is well known.

10. (g) The observations of Mr. PHILLIPS on the characteristics usually assigned to the scrofulous taint are not devoid of interest, although open to the objection already noticed (§ 4). He states that, in many "instances, most of the alleged characteristics of the scrofulous constitution may distinctly exist, while no strumous deposit takes place, and in others, diseases ascribed to the strumous habit may take place in persons in whom the marks alluded to cannot be recognised." In addition, however, to most of the indications which have been enumerated, Mr. PHILLIPS notices others which characterize also this diathesis, namely, a want of muscular development; an hypertrophied or infiltrated condition of the cellular tissue, which rapidly disappears under privation or disease; a pallor and coldness of the surface, owing to a feeble circulation; a marked disposition to disorders of the respiratory and digestive mucous surfaces; frequent soreness of, or discharges from, the nose, the eyes, and the ears; enlargement of the tonsils; the frequent dryness of the skin, or a greasy, sour, or fetid exhalation from the skin; and more or less disorder of nearly all the abdominal secretions and excretions.

11. (h) The colour of the hair is very variable; but for the most part it inclines, according to Mr. PHILLIPS, to a dark tint. Of nearly 9000 scrofulous children, he found a little over 32 per cent. had light hair and eyes. BARTHEZ and RILLET state that, of 314 tuberculous children, the hair was fair in 150, red in 4, chestnut in 71, black or dark in 40, and not observed in 49. Dr. GLOVER remarked that, in 126 cases, 86 had fair hair and eyes, and 40 were of a dark complexion; and that in some work-houses, 97 cases had a light, and 47 a decidedly dark complexion. Mr. PHILLIPS remarks, that "the *alæ nasi* may be broad, but for the most part they are not so. The upper lip, or even both, may be tumid, but in the majority of cases they are not so. There is not, as some have supposed, any thing constant in the shape of the lower jaw, or in the appearance of the teeth." He observes that the scalp and other parts of the integuments are often the seat of eruptive affections.

12. (i) It is obvious from the above that the strumous diathesis may be viewed as an original or an acquired deterioration of the constitution from the natural healthy pitch or condition; and that, before any actual manifestation of disease takes place, there may long exist such a state of organic nervous power, of circulation, of function, and of nutrition—of general asthenia, and of deficient structural development, as to constitute an obvious and wide divergence from health before the scrofulous formation or tuberculous deposit takes place; and, moreover, that the characters now described as constituting the scrofulous taint, cachexy, or divergency from the actual healthy condition, may exist for many years, or throughout a long life, without being followed by any of the marked structural manifestations of strumous disease or tuberculous deposit, although many determining or concurring causes very easily develop these diseases in very active and manifest forms.

13. II. OF THE CAUSES OF THE STRUMOUS TAIN, AND OF EXTERNAL AND INTERNAL TUBERCULOSIS.—The *causes* of scrofula have been investigated with much assiduity by Mr. PHILLIPS, but chiefly with reference to the external forms of scrofula, and as observed in young subjects. The limitation which he has assigned to the disease—the exclusion from his calculation of the tubercular or more internal states of struma—impairs or even altogether destroys the value that he has assigned to each of the causes he has investigated; and therefore they must be estimated either with reference to this limitation, or more loosely in the extended acceptance in which I have received the term. Mr. PHILLIPS remarks, that "hereditary influence, syphilis, bad air, bad food, and a cold and damp atmosphere, are the causes to which have been most frequently assigned the production of scrofula. The error of each theory is its exclusiveness; and when we reflect upon the difficulty of estimating the unmixed influence of any single cause, and when it is made probable that many causes are in action, we can scarcely comprehend how it happens that able inquirers should maintain with so much pertinacity not alone the efficiency, but also the universality of one." When describing the *etiology* of disease (see § 7-62, of that art.), the combined, the concurrent, and the determining operations of several causes were insisted upon in the production of the morbid effect; and this associated action has been duly recognised in the causation of most diseases, the one now under consideration certainly being no exception. The difficulty of estimating the influence of any one of the several causes which usually co-operate in producing a disease is certainly great, and is owing to circumstances which are more or less obvious. It has been attempted by certain writers to confer an arithmetical value on each particular cause, and the attempt has been followed by some in this country. But the nature of the subject, the varying influences of seasons, weather, localities, social and moral conditions, and numerous concurring and intercurrent agencies, render such precision unattainable, even if the requisite data, at given periods, could be obtained with due certainty; the attempts which have hitherto been made being characterized by more manifest errors

than have distinguished even the loosest descriptions of much less ambitious writers.

14. The author now mentioned justly observes, that the difficulty of estimating "the force of any of the so-called causes of scrofula is owing to the fact that the opportunity of observing a single agent in action alone is very rarely afforded: where one cause exists, another is almost certainly intimately associated with it; and to assign to each its proper influence is rarely possible. This is particularly the case with bad food, bad air, and bad clothing; the existence of the one almost implies the presence of another." Nevertheless, the attempt to estimate aright the influence of individual causes should not be neglected, when it can be made with a reasonable hope of success. And that it may be made with success, the following instances will show: 1st. In a large charity school, of considerably above 100 girls, cases of scrofula became remarkably prevalent, notwithstanding a sufficient supply of wholesome food and clothing, and attention to ventilation, and treatment produced no benefit. During my duties as a visiting trustee, I ascertained that the wooden floors of the sleeping and other apartments of the institution were washed daily. I contended, in the committee managing the charity, that this was the cause of the disease, and advised dry-rubbing; and that washing the floors should be adopted only on requisite occasions. This advice was followed, and the cases under treatment soon recovered, and no new case occurred. 2d. In a large school of boys, scrofula, both external and internal (tubercular), was of frequent occurrence, several of the parents having removed their children, not unfrequently during advanced or incipient tubercular disease. Having been sent to one of the children, I could find no fault with the food and exercise of the pupils, nor with the beds and cleanness of the apartments; but the sleeping apartments were much too close, too crowded, and ill ventilated. Upon the removal of the cause, the school became remarkably healthy. Now, in these instances, the causes just named could not be disputed as having been the most active; most probably, however, various predisposing causes having existed, especially hereditary constitution, as respected the individuals affected.

[The frequency of scrofula among the inmates of our orphan asylums has frequently attracted our notice, and several years since we entered upon a careful investigation of the causes. In a large majority of instances, we distinctly traced it to errors in the dietetic management, the food not being sufficiently nutritious, and composed too largely of vegetable matters. Thin soups, with but little tender meat, light gruels, mush and molasses, and a poor quality of bread, with but rare and scanty allowance of milk, and that often diluted, made up the diet; while, at the same time, they slept in crowded, confined, and ill-ventilated apartments, and seldom enjoyed the luxury of a bath. They consequently had a sickly, blanched, leucophlegmatic appearance, with a miserable look of premature age, anxiety and distress, instead of the joyousness of youth, stamped upon the features. (See our article on "Dietaries of our public Institutions," in vol. ii. of the New York Journal of Medicine.)

On substituting a more liberal allowance of

animal food, such as good milk, butter, and tender meats, with rice, potatoes, and a better quality of bread, a marked change was immediately observed; the children became more florid, active, playful, and cheerful, and the scrofulous indications gradually disappeared. Facts, however, warrant the conclusion that scrofula may be developed from sleeping in ill-ventilated places, even when the food is of proper quantity and quality. We have seen this, in several instances, in large boarding-schools, and in children of both sexes, and we look upon the breathing of impure air at night as one of the most frequent and efficient of all the causes of this disease in our country.]

15. The causes of scrofula have been variously arranged by writers. Some have viewed them as *predisposing* and *exciting*, others as *hereditary* and *occasional*. I shall notice, 1st. *Those which depend upon one or both parents*; and, 2d. *Those which change the constitution of the individual, especially during childhood, and which are independent of the constitution of the parent*; both classes of causes often concurring to produce one or other of the morbid results usually termed scrofulous, strumous, or tubercular—or external or internal scrofula.

16. i. CAUSES APPERTAINING TO ONE OR BOTH PARENTS.—A. *Hereditary Constitution or Predisposition*. The operation of this cause has been much over-estimated by LUGOL, and many other writers, and as much underrated by LOUIS, HENNING, BAUDELLOCQUE, PHILLIPS, and others. The circumstances which chiefly occasion this difference of opinion are the confounding of hereditary and congenital transmission of the disease with hereditary diathesis or constitution, and inattention to the fact that the parent or parents, who possess only the latent diathesis, may have children with the external signs of the disease in childhood, or with tubercular or internal scrofula at any future period of life, or with both manifestations of the disease; or that a parent affected with either the one or the other may have children presenting no indication of the malady beyond the latent diathesis, which, however, may be very obscure, or altogether absent, or may have an offspring affected by a different form of the disease from that of the parent. Let any observer of experience refer to what must be familiar to him, and he will find, what I have often remarked, that one parent possessed of the scrofulous diathesis has passed on to the age of sixty or upward, and has at last died of tubercular consumption, the other parent being of a sound and strong constitution, and either one or more of the offspring have had forms of external scrofula before puberty, or have grown up and been carried off by phthisis in after life; or have been affected both before and after puberty—some with external, some with internal scrofula. I have known many such occurrences, and even instances where the scrofulous diathesis, either latent or manifested by active disease, existed only in one parent, and yet, of numerous families, part died in early life, with external signs of scrofula as well as internal disease, and the rest, or the majority of the survivors, became consumptive at various ages, more or less advanced. Now, Mr. PHILLIPS and other writers, who consider tubercles a distinct lesion from scrofula, keep out of their calculations the former, and con-

sider the one to have no hereditary connexion with the other—a position which is altogether overturned by the numerous facts which are identical with the statement I have now made, the faithfulness of which is open to the investigation of every observer.

17. It is unnecessary for me to enumerate the authorities who have contended for the hereditary character of scrofula and tubercles; for the possession by the offspring of the diathesis or constitution of the parent or parents, more or less, or in one or more instances, and therewith the disposition to the same disease to which the latter was most liable. But, without regard to authority, let the matter be made one of observation, respecting which common sense is sufficient to judge. Mr. PHILLIPS remarks, that, after reading the essay of PORTAL on "Hereditary Diseases," he rose up in doubt, whether in the strict sense in which alone he thinks the question should be regarded, there be clear evidence that almost any disease is hereditary, though with respect to syphilis and small-pox the proof may be sufficient. Certainly much of the difference of opinion respecting the hereditary nature of the diseases depends upon the signification assigned to the term. No one at the present day considers that the offspring is born with the disease which afflicted the parent, although even this is the case in rare instances; but only that the constitution or diathesis is inherited, and with it the disposition to the same diseases which attended it in the parent or parents. This subject is, however, sufficiently discussed in the article DISEASE (see § 11, *et seq.*).

18. (a) *May the parent transmit scrofula or tubercles to the fœtus?* Scrofulous tumours and tubercles have been observed in the fœtus and in very young infants by DUPUY, ANDRAL, CHAUSSIER, BILLARD, and a few others. The instances in which they have been found are few, and the connexion of these cases with disease of the parents has not been shown in the majority of them. In three instances, in which the mothers died of consumption very soon after delivery, I found the lungs of the infants studded with tubercles in the first stage, a few having advanced to the second stage. The infants were remarkably emaciated, had cough very soon after they were born, and died in a few days. In these three instances, tubercles of the lungs of the fœtus were expected during the gestation of the parent by the practitioners in attendance (Mr. NICOLSON and Mr. WINSTONE), as well as by myself, and in each case the mother considered the child to have been born with the same disease as that with which she was afflicted.

19. (b) *To what extent may scrofula and tubercles be viewed as hereditary?* The statistical or numerical writers on this subject have mystified and misled many who pin their faith to authority and numbers, without inquiring into the data upon which their calculations are based, or into the meaning of the terms they employ. One of the most recent numerical pathologists, having defined and limited scrofula to be "enlarged cervical glands discovered by the touch or sight, sinuses or ulcers succeeding to such glands, scrofulous bones or joints, or the consequences of them;" and at another place having farther limited his definition to "disease of subcutaneous

lymphatic glands," gives the results of his examinations of 7587 children, and found nearly 23 per cent. of these bearing such marks of scrofula. He farther ascertained that, of 2021 children whose parents were both *untainted*, 21 per cent. presented marks of scrofula; that of 1092 children whose parents were both *tainted*, nearly 25 per cent. presented marks of scrofula; that of 2107 children whose father only was scrofulous, nearly 23 per cent. had marks of the disease; and that of 2367 children whose mother bore the marks of scrofula, while the father did not, nearly 24 per cent. presented signs of the distemper. Thus all that statistics here furnishes in favour of the hereditary influence of the scrofulous diathesis is not quite 4 per cent.; and many, believing in the precision and truth of numbers, would consider the evidence here adduced as most conclusive and incontrovertible. But of the children thus examined—their ages probably being from two to sixteen years—the lymphatic glands may have been enlarged, and returned to their healthy state before the examination was made, or either these glands or some other parts may have presented evidence of scrofulous change *after* the period of this examination; and, taking the more enlarged signification generally adopted, some internal organ may have become affected by the disease, either before or after puberty. It is not only external and palpable scrofula which is caused by the scrofulous taint, but also various internal maladies which are actually scrofulous or tuberculous in their nature, and which may be developed into an active state at any period either before or after puberty, an examination, on a single occasion, of numbers thus circumstanced, detecting a few merely from among them with the fully-developed or manifested malady.

20. But Mr. PHILLIPS does not stand alone in his skepticism of the generally received doctrine of the obvious hereditary nature of scrofula, and in his faith in statistics; for LOUIS, the apostle of the numerical method in medicine, states, with reference to phthisis, that in reality he had observed nothing decisive in favour of the hereditary character of that disease; and, in another place, that he had not collected any fact in favour of the hereditary nature of phthisis! But there is one circumstance connected with the hereditary nature of scrofula to which the numerical pathologists have paid little or no attention, namely, that the parent or parents may possess the scrofulous taint without any mark of the external or internal disease, and have one or more children which are either affected with open scrofula in childhood or attacked with phthisis in early life; and even that one or both parents of a scrofulous diathesis, without any developed disease, may have children, whose lymphatic glands or bones become tuberculous in early childhood, or whose lungs are thus diseased after puberty, and yet may not be the subjects of manifest strumous disease throughout life, or not until a far advanced period. In these circumstances the hereditary tendency would not be detected or reckoned by those who employ figures as their arguments, and thus their statistics would be vitiated, or rendered by this and other sources of error altogether worthless. That the hereditary character of scrofula and tubercles has been exag-

gerated by some writers may be admitted; but that it is so low in amount as some recent writers contend, or even nearly so low, will not be demonstrated by future observers who shall view all the circumstances and facts connected with the subject with due accuracy.

21. Of 80 cases observed by Dr. GLOVER, the predisposition to tuberculous affections—to scrofula in the sense in which I have viewed it—was hereditary in 42; very few of the remainder furnishing clear evidence of the transmission. There appears some reason, he adds (and I agree with him), to conclude "that the popular idea of evidence of the family taint often passing over one generation, or appearing in the uncles and aunts, while the parents are free from the disease under which their offspring labours, may not be incorrect."

22. The hereditary predisposition is, according to my own observation and that of several others, more frequently derived from the mother than from the father, although the difference is not great, much depending upon the causes in operation in early life. The mother of nine children—six females, three males—had early signs of external scrofula; four of the female offspring died of phthisis between the ages of 20 and 30, and one of the males. All the children of the two remaining females are possessed of the scrofulous taint, and about one third of them have external scrofulous disease. Dr. PRITCHARD has justly remarked, that all original connate bodily peculiarities tend to become hereditary, while changes in the organic structure of the individual, from external causes during life, commonly end with him, and have no obvious influence on his progeny. There is no doubt of the strumous hereditary taint having disappeared from families, especially when it existed only on one side, more particularly when the mother was strong, healthy, and suckled her own children, and when the latter were placed in favourable circumstances in childhood and early life as respected air, locality, ventilation, exercise, and food.

23. *B. Diseases of the Parents.*—It has been justly remarked by Sir JAMES CLARK, "that a state of tuberculous cachexy is not the only morbid condition of the parent which entails the tuberculous predisposition on the children; there are several diseases which have this effect, the most important of which are a disordered state of the digestive organs, gout, cutaneous diseases, the injurious influence of mercury on the system, debility from disease, age, &c. In short, a deteriorated state of health in the parent from any cause, to a degree sufficient to produce a state of cachexy, may give rise to the scrofulous constitution in the offspring." This opinion has been questioned by Mr. PHILLIPS, but I believe it to be in the main correct. Not, however, that parents thus circumstanced necessarily have children who become scrofulous in childhood, or tuberculous subsequently; but that the children of such parents are much more liable to be so diseased than the offspring of strong and healthy parents.

24. (a) *Of the influence of the syphilitic taint, and of the mercurial cachexy in the parent, in affecting the organization of the offspring so as to favour the development of external or internal scrofula*, many writers are quite convinced.

ALIBERT says, that "almost all the scrofulous cases at St. Louis are owing to a syphilitic infection transmitted hereditarily;" and CAMPER, STOLL, PORTAL, and HUFELAND entertain a similar opinion. Others are of a different opinion, especially KORTUM, CULLEN, BAUMES, BAUDELLOCQUE, and PHILLIPS. It is impossible to separate the influence of secondary and tertiary syphilis from that produced on the constitution by the excessive or prolonged courses of mercury, as, in former times especially, both were more or less injurious to the constitution of parents, and most frequently in connexion with each other. That parents thus circumstanced may have children free from any scrofulous taint may be conceded; but that their offspring are more frequently affected with either external or internal scrofula, at the respective ages of the occurrence of these, than the children of parents who have not been similarly circumstanced, I am convinced by the frequent occurrence of these states of scrofula in children born of a parent or parents whose constitutions, originally most sound, were deteriorated by one or both of these causes. I am aware that numerous instances will occur of the immunity of the children of parents thus circumstanced from scrofula; but many of these have not been observed or traced farther than childhood, or even than the earlier years of this epoch; and of those thus accounted exempt, or even robust or healthy at this period, many become tuberculous at more advanced ages.

25. (b) *That very aged, gouty, exhausted, or debilitated parents* have children much more predisposed to external or internal scrofula than the offspring of healthy, mature, or young parents, has been asserted by many, and denied by some. It is more generally admitted that the children of such parents are delicate; but the opinions of many of the most observant writers of the seventeenth and eighteenth centuries confirm that of FERNELIUS, no mean observer, and justly possessed of the highest reputation in the sixteenth century, viz.: "Senes et valetudinarii imbecilles filios vitiosa constitutione gignunt;" and VAN SWIETEN has illustrated the opinion with his wonted ability. In the same category parents who have exhausted themselves by *masturbation*, or by *premature or excessive venereal indulgences*, may also be placed. On this subject Mr. PHILLIPS remarks: "I do not, however, deny that children born of parents advanced in life, as well as those born of youthful parents, may present less of vigour than the offspring of persons in the prime of health and strength, but it is not proved that they usually become scrofulous;" and he admits only that these children are often, though not always, weakly, and that a weakly child, placed under unfavourable circumstances, is more likely to suffer from scrofula than a strong one, but simply because he is weakly. It is difficult to prove the extent to which children born of parents of the description under consideration are liable to be scrofulous or tuberculous, or are more liable to become so than other weakly children; but that they are actually more or less liable to be thus affected, I believe.

26. (c) *Does the milk of a scrofulous nurse occasion scrofula in the child?* Mr. PHILLIPS has ably discussed this topic, and has adduced opin-

ions in the affirmative as well as negative. BORDEU said that scrofulous nurses communicate the disease to the child. WHITE, FAURE, LALOUETTE, and PUJOL, on the contrary, denied that a nurse could transmit scrofula to her nursing. "But the impression that the disease may be thus communicated exists on the minds of many medical authorities in the present day." Yet, in support of this opinion, Mr. PHILLIPS states that he knows no single well-observed fact on record. I agree with him in concluding that, although there is no proof of the justness of the opinion "that the disease may be propagated in this way, neither is it easy to procure proof that it could not happen, since such proof could only be negative; meanwhile, as all our present evidence is negative, we are justified in saying that such communication is, in the present state of our knowledge, inadmissible."

27. (d) *Frequent Intermarriages, or Marrying in and in.*—It has been alleged by Mr. CARMICHAEL and others, that frequent and close intermarriages are generally followed by a puny race, and frequently by scrofula in one shape or another. On this topic Mr. PHILLIPS remarks, that there is no clear evidence of the bad consequences, either in the mind or body, of frequent intermarriages. As concerns the human race, the point is not easily elucidated, and the evidence is not conclusive that the practice is very injurious in the lower animals. Isolated classes, as Jews, Quakers, &c., furnish no evidence in support of the opinion; but the isolation of these or other classes is not so complete as to determine the question. The closest intermarriages or connexions between the sexes exist in several countries of Central Asia, as Thibet, &c.; but the inhabitants are said to be robust and healthy, the population being, however, kept down by one female in a family having several husbands, and those frequently her nearest male relations. Mr. PHILLIPS concludes that intermarriages among healthy persons tend to no such calamity as the production of scrofula, but that he must not be understood to assert that other physical or mental influences may not result from such unions. I believe, however, that a comprehensive consideration of the subject, and with reference to the lower animals as well as to man, will show that a close breeding in and in, when continued for more than three or four generations, will occasion a degeneration of the offspring; while crossing of races or breeds will give rise to increased development of constitution and power, especially in the weaker race. The Turks and Persians are manifestly indebted to the females of Georgia and Circassia for the best of their constitutional features; and few who have taken any interest in tracing the history of aristocratic families, even in this country, and are acquainted with the private histories, the intrigues, and intermarriages or crossings of many of them since the commencement of the seventeenth century, can fail of knowing how often family descent has thereby been preserved nominally, although not most legitimately.

28. (e) *Does the habitual use of certain articles of food predispose the offspring to scrofula or tubercles?* It has been supposed that pork, and the viscera and blood of animals, favour the occurrence of gout in those who frequently use them as food, and often give rise to scrofula in

their offspring. That these articles of diet are very often productive of diarrhoea, dysentery, and other disorders of the digestive organs, more especially in warm climates, cannot be disputed; and I believe that the offspring of those who live much on pork and bacon are more liable to scrofula, in some one or other of its forms, than persons who use a different or more wholesome diet.* The food of the parents may reasonably be expected to influence the constitution of the offspring, and hence to predispose to certain diseases in preference to others. It is difficult to determine the influences, either of an excessive use of animal food by the parent or parents, or of the restriction to vegetable diet solely, in causing scrofula in the offspring; but that either extreme may have a predisposing effect, especially when aided by other causes, may be reasonably inferred. That the vegetable diet of the Hindoos does not exempt them from the presence, if not from the prevalence, of struma, appears to be established. It is not improbable, however, that a vegetable diet in a temperate and healthy climate, when it is wholesome in kind and quite sufficient in quantity, does not, *ceteris paribus*, predispose the offspring to this distemper; while the excessive use of animal food, and more especially of the articles of food just noticed as often injurious, is more likely to produce a noxious effect.

29. (f) *Insufficient*, as well as *unwholesome food*, certainly predisposes the offspring to scrofula, both external and internal; and when this is associated, as it too frequently is in the lower classes, with addition to *spirituous liquors*, the injurious influence is the more marked, particularly when the mother is thus circumstanced and addicted during the periods of utero-gestation and of lactation. I have on numerous occasions remarked this to be among the most undoubted causes of strumous affections in the poor; but it is so generally associated with others about to be noticed, especially impure air and insufficient ventilation, that it is impossible to say truly what degree of influence may be assigned to it solely. The numerical pathologists may, however, assign it a number; I therefore leave its true value to be calculated by them.

30. ii. *CAUSES ACTING CHIEFLY DURING EARLY LIFE.*—The causes of struma occurring during early life act directly on the subjects of the distemper. These causes may be in operation during infancy solely, or during later childhood,

* There can be no doubt, we think, that the use of pork has a tendency to produce scrofula, and many cutaneous diseases. The Shakers, in some parts of our country, have wisely abandoned its use. It is somewhat remarkable that whatever was regarded as unclean in the Mosaic catalogue of edibles is still thought to be unfit for human food, with the exception of swine. If scrofulous affections are not actually generated, they are at least aggravated by its use. A friend went to the South, where he was so situated for a year that *fat bacon* constituted almost the only animal food he partook of during that time. His skin, which was before smooth and fair, became darker-coloured, rough and husky to the feel, to which succeeded sores and boils, which matured and discharged, leaving obstinate ulcers of an unhealthy character, and the general health much impaired. At the end of the year he returned North, where, upon a change of diet, he soon recovered, and has had no return of the cutaneous affection. We have observed other cases of a similar kind, and therefore would enjoin entire abstinence from this gross kind of food, at least to all who are predisposed to, or already labour under a scrofulous diathesis.]

or not until puberty, or even not until after this epoch. They are among the most influential causes of the distemper, especially when acting more or less in combination, as often observed respecting some of them. It is generally difficult to determine the influence of each, or even of several of them, when operating either co-etaneously or in succession, particularly when the constitution presents an hereditary taint, and in this case those causes are the most efficient in developing this taint into open or manifest disease. The *milk* of the nurse, especially if she be circumstanced or addicted as just mentioned (§ 29), or if her health be such, owing either to natural delicacy of constitution or to disease, as to render her milk insufficient, innutritious, or unhealthy, is a most influential cause of debility and disease of the infant, this disease assuming more frequently the form of internal or external scrofula, than any other. In connexion with suckling of the infant, there are several causes which often concur in the production of the morbid effect; the most influential of these are the articles of food given to the infant either supplemental of the milk of the nurse, or during and after weaning, and the state of the air which the child breathes by night as well as by day.

31. *A. The food and drink* which are best adapted to the infant, before it has got several teeth, is the milk of a healthy mother or nurse; and in as far as a departure from this food takes place, so far will the development of scrofula be risked. When the mother is incapable of suckling, or her milk is unhealthy or insufficient, a healthy nurse is required; and if she cannot be obtained, then the best means of feeding the infant should be adopted. In the various circumstances in which children are brought up, it is very difficult to determine the share of injury which may be imputed solely either to the nature and amount of their food, or to the state of the air which they breathe, or to the other influences which surround them. M. BENOISTON DE CHÂTANNEUF states, that of infants nursed by their mothers in Paris, 18 per cent. die in the first year, and that of those suckled by strangers, 29 per cent die in the same time. Doubtless much of this mortality is to be imputed to other causes, as to the close unhealthy air of a large city, as well as to those connected with the food of infancy. Both in towns and country districts, healthy wet-nurses cannot be obtained, owing to the circumstances of the majority of those requiring them; and artificial feeding becomes their only resource. This feeding, independently of the many unfavourable influences which concur with it, fails of furnishing an appropriate nourishment; and, consequently, a very large proportion of the infants who are subjected to this mode of rearing die in their first year; and of those who live, many become the subjects of internal or external scrofula. Mr. PHILLIPS has adduced a series of statistical details, illustrating the deaths during infancy of the inmates of several infant institutions, where the children are brought up by hand; and in these the deaths in the first year appear to vary from upward of 80 to 50 per cent. In *Lyons*, a crowded manufacturing town, where the infants are suckled, the mortality in the first year was 33 per cent., the ordinary mortality at Lyons during the first

year being about 20 per cent. In the London Foundling Hospital, where the children are provided with wet-nurses, the deaths are 22 per cent. during the first five years, and of these 10 per cent. only die during the first year; but it should be recollected that a child is rarely admitted before the third month, and that it is during the first three months of life that the mortality is greatest. In large manufacturing towns and cities the number of infants reared by hand is greatest, and the deaths are also much the greatest; and the proportions of the survivors that become scrofulous is also the greatest. In London, the number of infants thus reared who die during the first year is three or four times as many as those who die from among those similarly reared in the country.

32. While very much of the mortality, and of the disease of the survivors, of those reared by hand, is to be imputed to this cause, much also should be referred to the kind of food which is substituted for the milk of the mother, to the air which the infant breathes, and to the other circumstances by which it is surrounded. As respects the *kind of food* which is thus substituted, it may be stated that, in manufacturing towns, where the married women employed in the factories rear their infants by hand, little attention is paid to the nature of the food, and few of the children survive the first or second year, most of the survivors becoming scrofulous or tuberculous. Mr. PHILLIPS justly remarks, that there are two things to be noted in respect of children thus circumstanced, viz., the nature of the food and the manner of taking it. The food, even if it be milk, instead of being drawn directly from the mother, has probably been obtained some time before from a purely herbiferous animal—the cow, between the milk of which and that of human milk there is a very considerable difference, that of the former containing more than twice as much casein, and much less butter and sugar of milk. Moreover, in towns the milk of cows is often unwholesome, especially to infants, owing to the confinement of and modes of feeding these animals, and not unfrequently to tubercular disease developed in them by these causes. The same author justly adds, that the mode of taking the food exercises an important influence on the health of the infant. By the act of suckling, a certain quantity of saliva is pressed into the mouth, and is mixed with the milk, so as to render its digestion easier. Indeed, this is essential to good digestion in infants. Moreover, the act of sucking is an exertion which can be made only for a certain time, and hence over-distention of the stomach is prevented; while, when fed by hand, the risk of over-feeding is often run, by the anxiety of the nurse, and harm from this is not unfrequent.

[Much of the milk consumed in our large cities is formed from the slop of grain distilleries, the cows yielding it being confined in close, filthy, and ill-ventilated stables. Such milk is found to contain but a small quantity of butter, of a whiter colour than natural, and associated with more curd and whey than that obtained from other milk. The milk globules are less abundant than in good milk, and of smaller size. Such milk, also, contains a larger quantity of epithelial-cells, some distinctly granular, and

others higher-coloured, than pure and healthy milk. The sale of such milk should be prohibited by law. The nature of fermentation and distillation is to abstract from the grain all the fecula and sugar, the principles that are more particularly convertible into milk and butter, leaving the nitrogenized compounds, and also the casein and earthy matter, nearly untouched; hence the increased quantity of ashes, and also of casein, the nitrogenized compound in milk, while the sugar and butter are below the usual standard. Animals thus confined become diseased, tuberculous and scrofulous, and there can be little doubt that the use of such milk tends to develop these diseases in the human subject. It is a well-known fact, that a much larger proportion of the children of the poor in our large cities are affected with scrofula than of the same class in the country; and though breathing impure air may be one of the causes, we believe that the use of diseased milk is still more efficient in producing the disease. An extensive dispensary practice of several years furnished a multitude of facts in support of this belief.]

33. In the greatest number of instances, instead of milk, gruel with a little milk, sopped bread, or flour, or other farinaceous substances, are used. This food is assimilated with difficulty, and readily gives rise to acidity, flatulence, and irritation of the digestive mucous surface, with all the consequent evils of insufficient secretion and excretion, and impaired nutrition. Mr. PHILLIPS justly remarks, that these evils are made evident by the following facts: "In Lancashire and the West Riding of York, the deaths in the first year of life are to the total deaths as 1 to 3.9; while in Devon and Wilts they are one to 6.4! Now it is in the great factory towns, which are found in Lancashire, Cheshire, and Yorkshire, that the system of bringing up the child by hand is most commonly practiced, and where its evils are most apparent; first in the great destruction of infant life, and, failing that, in the development of scrofula. It is not that the mother has no milk, but that in such places she is enabled to make what she considers a more profitable use of her time than by staying at home and nursing her child. Her infant may be suckled at early morn, and again in the evening; possibly, too, at the middle of the day; but whatever food it may require at the intervening periods, if furnished at all, is afforded in the shape of the crudest and most inappropriate substances, and restlessness is known, in many places, to be habitually repressed by GODFREY'S Cordial." But the mothers are not solely the guilty parties in these circumstances. The fathers are often so drunken and dissolute as to provide little or no food for their families, and the mothers are therefore obliged to be employed in the factories to provide for the wants of their children, entertaining at the same time but little desire to add to their number, or to devote much care on those which require it the most.

34. The digestion of infants is rapid, and as the quantity of food taken at a time is small, it is necessary that, during the first month, the interval of feeding should not exceed from one and a half to three hours. If, in addition to inappropriate food, the intervals between the periods of administering it be much more pro-

longed, as it often is in manufacturing towns, the evils must be so much the greater. Mr. PHILLIPS states, that in the larger factory towns the deaths from tuberculous and scrofulous diseases are as 1 to 31 of the total deaths during the first year of life, while in the metropolis they are as 1 to 42. During the whole of life they are 1 to 5.6 in the factory districts, and 1 to 6.4 in the metropolis. According to the experience of Friendly Societies, he adds, the expectation of life in rural districts at 30 is 38.4 years, and in cities 32.8 years. Of the total population living at the age of ten, one half will have disappeared in cities before the age of 62, and in towns before 65; while in rural districts half the population will attain nearly 69 years. The greater longevity of the latter, or the less prevalence of scrofula, is not to be imputed to the food only, even granting this be more nutritious and more appropriate, for the former may possess the greater advantages in this respect; but to the air, ventilation, exercise, &c., enjoyed by those residing in country districts.

35. Dr. BARON HOWARD gives a just but melancholy description of the character of many of the operatives in large towns. "A large proportion of those who regularly receive high wages are constantly in a state of the greatest poverty, and often bordering on actual starvation; their houses are almost destitute of furniture, comfortless, and uncleanly; too often damp, cold, and ill ventilated. Their families are ill fed, scantily clothed, and badly lodged. They live much on innutritious and indigestible food, and often use articles of bad quality, or such as are rendered unwholesome by adulteration, or by being kept too long. They are extremely intemperate in their habits, and, instead of purchasing wholesome food and proper clothing, the greater part of their wages is often expended by anticipation at the public house. The effect of the intoxicating liquids they consume is of course to produce a temporary excitement of the whole system, which is succeeded by a corresponding depression; they lose all relish for plain, nutritious food, and their appetites can be stimulated only by something savoury and piquant. This kind of diet does not afford sufficient nourishment to repair the losses the body is continually sustaining; great languor and debility are the consequences; for the removal of which stimulants are again had recourse to, and thus an alternately excited and depressed state of the system is kept up. By this mode of life, too, the digestive organs become impaired, and the function of digestion is so feebly and imperfectly performed, that even much less nutrition is extracted from the indigestible and impoverished diet they use than would be the case if the digestive organs were in a healthy condition." This writer adds, that "scrofula, in all its varied forms, may be mentioned as one of the commonest diseases prevalent among the destitute poor, and which frequently originate in deficiency of food." There can be no doubt of the justness of the conclusion at which Mr. PHILLIPS arrives from his researches, namely, "that in Great Britain scrofula is least prevalent where children and others are best fed; and although I by no means assume that the immunity is entirely owing to better feeding, because where much attention is bestowed on

the food it is hardly likely that other means of maintaining health will be neglected; yet I would submit, as a fair deduction from the foregoing evidence, that food exercises a more important influence than any other agent in the production of scrofula"—(*Op. cit.*, p. 175.)

36. (a) *What influence has particular kinds of food in causing scrofula and tubercles?* This question has been differently, but not satisfactorily answered. Several articles of diet have been accused of producing this effect, and to certain of these I have adverted above (§ 28). HALLER was among the first to mention the opinion of the prevalence of this distemper being caused by the use of potatoes. The use of these, as the staple article of food in Ireland, where scrofula is more prevalent, and the value of life is less than in England, tends to show that they may be concerned in producing these effects; but it ought not to be overlooked that they afford insufficient nourishment, and that there are other causes in operation. Mr. PHILLIPS believes that those who live almost exclusively on vegetable food in this country are less robust, and exhibit a greater tendency to scrofula, than those who subsist on an admixture of animal and vegetable food; and he considers that our own rural population, as well as that of Scotland and Ireland, bear out the assertion. "But, although it has been shown that insufficient and improper food, however associated, may lay a foundation for that disease, we have, in truth, no conclusive proof that any particular article of food directly tends to the production of scrofula."

37. (b) *The drink or beverage used by infants and children has no mean influence in favouring the development of scrofula, and of tubercles at a more advanced age.* Among the lower classes, especially in large and manufacturing towns, the frequent recourse to anodynes and carminatives, containing narcotics, sedatives, &c., in order to procure sleep or quiet for infants and young children, and to allay their wants, cravings of appetite, and irritations of temper, is of itself no mean cause of their weakness of constitution, of imperfect development of both mind and body, of scrofulous and tubercular formations, and of various other diseases, as they advance to puberty and manhood. The not infrequent practice, among the lowest and most abandoned classes, of giving spirituous and other intoxicating liquors to their children—of causing their infant offspring to partake of the noxious beverages in which they are themselves indulging—is productive of effects, in the innocent victims, of a similar kind to those just stated. The vices of the parent are, in the present state of society, not merely passively propagated in the offspring—to even the third and fourth generation—but are not infrequently most actively and feloniously extended, at the most tender and helpless periods of existence, to those for whom the ties of nature should be most intimate and indissoluble.

38. *B. Contaminated states of the atmosphere* are often not less influential than the nature and quantity of the food in causing scrofula and tubercles, and frequently they are the chief causes. The air may be contaminated by exhalations from drains, cess-pools, sewers, and water-closets; or by stagnation or insufficient renewal; or by being respired frequently or by

a number of persons or animals, without the requisite renewal; or by these several causes conjoined. In a very large proportion of the houses in manufacturing and other towns, as well as in many in country districts, the water-closets, drains, and sewers are so imperfectly constructed as to admit of the evolution of the foul air from the exuviae, &c., of the inhabitants, not only around, but even within their dwellings, so that they who reside in those houses are constantly breathing an air loaded with the vapours arising from the decomposition of their own excretions, which remain collected under, or close to, or even within, their apartments. These sources of contamination have been fully exposed in the article PESTILENCES—PROTECTION FROM (§ 9, *et seq.*)

39. *C. Next in importance to this source is the congregation of numbers in a close or insufficiently ventilated place,* more especially in a close sleeping apartment. Among the most prevalent causes of scrofula and tubercles, especially in the present state of society and manners, there are perhaps none more influential than congregating children and young persons in boarding and large schools, where they are often scantily fed, and through the greater part of the day restricted in air and exercise; confined in a school-room often insufficiently or improperly warmed, and improperly ventilated, in order to economize fuel; subjected to premature mental exertion, or to cramming modes of instruction; and packed into sleeping apartments insufficiently ventilated, and much too small for the number confined in them. It is a common practice in boarding-schools, in large towns, to put from six to twenty children or young persons in the same sleeping apartment; and the parents are, from ignorance, or the delusion of having a bed assigned to each, contented with the arrangement. Many such apartments even have not, during night, any ventilation, excepting what takes place by the fire-place, both the doors and windows being closed; and so foul does the air become by the morning, that it is sickening to a healthy person entering the chamber, so completely is it loaded with the emanations resulting from the insensible and sensible perspiration, and from having been repeatedly respired.

40. *This self-contamination of the air is often only supplemental of the contaminations derived from other sources, especially from such as have been just mentioned; and which, although injurious in many private seminaries, are even still more so in many large institutions and charities, owing to the congregation of greater numbers, particularly in sleeping apartments, to ill-regulated diet-tables, to insufficient exercise in the open air at a period of life which requires air and exercise for the healthy development of the frame, and to the over-exertion of the mind to the neglect of healthy pastimes and amusements.* This cause is especially productive of the more internal forms of scrofula, and particularly of tubercles of the lungs, and is the more influential as being in continued operation during the periods of the growth and development of the frame. These congregations of young persons, especially during the age of puberty—at the period of sexual evolution, when instinctive impulses are too strong for the control of the weakly-exerted dictates of reason,

often lead to practices which tend—and tend more than any other cause, especially at such early periods of life—to exhaust the powers of life, to impair and viciate nutrition, and to favour the production of the several forms of the distemper now being considered. This mode of life, at this early age, as well as several others to which the lowest and even the highest, are often subjected—the one from misery and necessity, the other from ignorance, vanity, and excessive care—is not infrequently rendered still more injurious by the want of due exposure to the sun and air.

41. *Exhalations from privies, cess-pools, drains, and sewers*, especially in large institutions, manufactories, and towns, occasion this as well as other states of constitutional disease; and to these are often added the emanations from burying-places. Among the poor, the influence of cold, often conjoined with humidity, and with over-crowding and insufficient ventilation; the exhalations from the soil, and from the animal and vegetable matters which are undergoing decomposition in or upon the soil; living in damp, cold cellars and apartments on the ground floor, insufficiently drained and ventilated; and want of light and sunshine, are causes which aid the operation of hereditary predisposition, and of deficient or improper food.

42. Children and young persons subjected to the causes now mentioned become delicate or sickly. The vital endowment and the structural development of the several organs and textures are impaired or arrested in their progress. Like plants growing excluded from the sun and wind, their vessels often extend rapidly in the direction of their axis; but the parietes of the vessels and their lateral branches are thin or weakly formed, are surrounded by a lax cellular tissue or parenchyma, and both the organic nerves and the animal fibres are imperfectly constituted. The formative processes seem arrested before they are completed. The circulating fluids present a superabundance of the serous and albuminous constituents, and a deficiency of fibrin and of red globules. While the blood is defective in its crasis, the blood-vessels are impaired in their tone, and the venous and lymphatic systems are more manifestly or more prominently developed. This condition of the frame often proceeds, as shown above, from the parent or parents. In many cases it is acquired in early life from various causes, especially from those now mentioned, as insufficient or improper food, breathing an impure or self-contaminated air, a cold and humid atmosphere, or dark, cold, and damp apartments, cellars, &c., the crowding of numbers in ill-ventilated places, and particularly in sleeping apartments, premature sexual indulgences, and solitary vices which waste or exhaust nervous and vital power, and consequently impair the digestive and nutritive processes, at the periods of life when due assimilation and nutrition are most required; and, while these causes often generate this state of frame, they produce, in various parts, textures, and organs, but particularly in the lungs, the deposit of tubercular matter.

43. There are other causes or circumstances influencing the constitution of young persons which have been viewed by some, and denied by others, to be concerned in the production of scrofula; but much of the difference of opinion

on these topics depends upon the limitation of the term scrofula, or the extension of it to the senses already stated (§ 4, *et seq.*). That confinement in prisons, in poor-houses, in asylums, in charitable institutions for education or reformation, in factories, &c., will occasion some form or other of scrofula, more especially tubercular deposits in internal organs, cannot be gainsayed with truth, although this morbid effect may be manifested in so few as to almost justify the denial of its existence, especially where a sufficiency of wholesome food, exercise in the open air, due light, ventilation, and sunshine are enjoyed. But where these are more or less wanting, and especially where there are over-crowding, particularly in sleeping chambers; low ranges of temperature, conjoined with dampness; contaminated states of the air; depression of spirits or anxiety of mind, &c., the morbid effects will soon become manifest, and frequently in the forms constituting those now under consideration. Most of the causes already considered have been numerically and statistically investigated by Mr. PHILLIPS, who has thrown much light upon several of them; but, in the extended sense in which I have viewed the subject—not solely with reference to external scrofula, nor to childhood, but with regard to both the external and internal distemper, as observed at all periods of life—I believe that several causes, which he views as possessed of little or no influence, are actually deserving of more consideration and elucidation than they have hitherto received. There can be no doubt that, in the several circumstances just enumerated, and in the different classes, positions, and employments of life, certain causes are more influential in some of these than in others—in one class or occupation than in the rest; and that, where several causes are in simultaneous action, it is difficult to estimate the relative value of each; but, nevertheless, whatever cause has the effect of lowering the powers of life, of impairing assimilation, nutrition, and strength, will, in a considerable proportion of those thus affected, give rise to tuberculous deposits, particularly if an hereditary predisposition or constitution already exists, and will reinforce or determine the action of other agents in developing this mischief.

44. *D. May scrofula and tubercles be communicated by contact or inoculation?* (a) ARETÆUS believed in the communicability of scrofula, and considered it dangerous to live in the same room with scrofulous persons. BAUMES, CHAMETON, and others, have entertained the belief of the transmission of the disease to infants suckled by scrofulous nurses. BORDET, no mean authority, states that young healthy women have married scrofulous men, and have become so themselves. BAUBELLOCQUE, however, remarks that in the “Hôpital des Enfants” there are 150 beds occupied by scrofulous patients, but that he has never observed any thing that occasioned a suspicion of contagion. Mr. PHILLIPS says that he never heard of a single instance of the communication of the disease by contagion in the several institutions which he has visited. PINKEL and RICHERAND have furnished a similar testimony.

45. (b) *Inoculation of scrofulous matter was practiced by HEBBEARD on dogs, but no sign of scrofulous infection was observed. LEPELLE-*

TIER tried similar experiments without effect; and Mr. PHILLIPS states that LEPELLETIER, GOODLAD, and KORTUM applied scrofulous pus to the wounds made for vaccination, and also to wounds made without reference to vaccination, but that scrofula was not produced, although the vaccination succeeded when the vaccine lymph was introduced with the scrofulous pus. Such experiments are most unwarrantable, and even criminal.

46. There may be but little risk of infection from cases of scrofula, when the disease is seated externally. But I believe that there is some reason for believing tubercular disease of the lungs, in the second and third stages, by no means devoid of risk to healthy persons, who may frequently inhale the breath of persons in either of these stages of the malady, or may sleep in the same bed, or even live in the same room, if small or ill ventilated, with persons thus diseased. It should not be permitted for a sickly or scrofulous child, or even for any one with pulmonary tubercles or with open scrofulous sores, to sleep in the same bed with a healthy child or person, however confidently several writers may assert the non-communicability of this distemper; for, although this may be true in ordinary circumstances, those which I have just mentioned may favour the occurrence of very different effects.

47. (c) *May pus from a scrofulous person, although not derived from a scrofulous ulcer, communicate the malady?* It has been supposed that leucorrhœa in scrofulous females, and that vaccination, or variolous inoculation, from a scrofulous child, will communicate scrofula to persons of a sound constitution. Several writers have favoured the affirmative of this question, but their facts are false, and their reasoning inconclusive. Mr. PHILLIPS remarks, that "an important question is raised by RILLIET and BARTHEZ with reference to the influence of small-pox and scrofula. We have seen that DE HAEN and ROWLEY were of opinion that the inoculation of small-pox had a tendency to excite in the system the development of scrofula; while RILLIET and BARTHEZ state that, in any of the variolous cases they have observed, the eruptive fever has not been terminated by tuberculation. They believe it to be proved that small-pox and tubercular disease are of different natures, and mutually repel each other; that since the use of vaccination tubercular diseases had become more frequent; that those children who die without having had small-pox are more frequently tubercular than otherwise; and that of those vaccinated a greater number are disposed to tubercles than of those who have not been vaccinated. They, however, guard themselves from assigning vaccination as a cause of tubercles; all they have been able to observe is, that a greater number of vaccinated children die with than without tubercles. The only precise evidence they furnish for the opinion is the following: Of 208 vaccinated children, 138 died tubercular, 70 non-tubercular. Of 95 children who died without having been vaccinated, 30 were tubercular, 65 not so" (p. 149).

48. These results certainly agree with my own observations, and confirm an opinion I have long entertained respecting the comparative effects of vaccination and small-pox upon the prevalence of scrofula. That scrofulous and

tubercular matter may become partially resolved and absorbed, the cretaceous or mineral parts of the deposit only remaining, has been proved to take place, but the exact circumstances in which it does take place have been very insufficiently ascertained. RILLIET and BARTHEZ believe that small-pox more especially, scarlatina, and typhoid fever, tend to favour this resolution. That scrofulous and tubercular affections have increased since the introduction of vaccination is undoubted; and that the dangers from the inoculation of small-pox, under due management and care in preventing the occurrence of the non-inoculated disease, were actually few, although remarkably exaggerated, are also certain; so that, balancing the results from the introduction of the one and from the suppression of the other, it is very difficult to say that humanity or society has gained any thing by these measures.

[This statement of our author, before it can be fully admitted, must be sustained by a more extensive collection and analysis of facts than has yet been presented. The observations of RILLIET and BARTHEZ have not, so far as we can learn, been confirmed by the experience of others whose attention has been turned to this subject. Our own belief is, that scrofula and tubercularis were far more common and fatal before the practice of inoculation or vaccination was introduced than they have been since. The thousands who were subjected annually to the royal touch for the cure of scrofula, shows very conclusively that the disease was by no means infrequent; while the ill-constructed habitations, the wretched diet, the neglect of personal and domestic cleanliness, and the total ignorance and disregard of sanitary observances and the laws of health, predisposed all classes of the community to this malady. We cannot, then, but regard vaccination as the greatest blessing ever conferred by science upon humanity, and JENNER as one of the greatest benefactors of the race.]

49. *E. May other diseases occasion scrofula and tubercles?* As already shown, it cannot be doubted that vaccination favours the prevalence of the several forms of scrofula; but it is not evident how this result is produced. Can it be occasioned by the inoculation of a virus, which, although productive of a local effect, causes a certain taint of the constitution which is not prevented or removed by its elimination in the form of pustules on the external surface? According to this view, vaccination may be, in many instances, the introduction of a poison or virus, which slowly and silently contaminates the frame, without being matured and thrown out on the surface, while small-pox has a very different effect, owing to the free suppuration of the pustules, and the elimination thereby of the morbid material or virus from the system. Besides vaccination, inflammations, measles, whooping-cough, &c., have been supposed to favour the production of scrofula; but there is not sufficient evidence to prove this occurrence, farther than that all diseases which lower vital power and resistance will more or less aid the operation of the more efficient causes of this distemper. Notwithstanding the laudation bestowed upon vaccination, I believe that, as the lapse of time allows the fact to be more fully demonstrated, it will be found to be a not unfruitful source of

scrofula and tubercles, and that its effects will be imputed to the circumstance just mentioned.

50. *F. Climate, residence in large towns, occupations in factories, confinement in union-houses, in pauper institutions, in prisons, &c., and other circumstances tending to prevent due exercise in the open air, or sufficient ventilation, or to deprive persons in early life of the requisites to healthy assimilation and nutrition, may be considered as concurring agencies in the production of either external or internal scrofula.* Mr. PHILLIPS has investigated these analytically, but with reference only to the production of external scrofula, and has come to the conclusion that "the development of scrofula is not shown to be so influenced by climate or temperature as to bear any definite relation to the warmth or coldness of the country in which the disease is found. Neither the general mortality nor the deaths from scrofulous diseases bear any definite relation to the closeness with which the population is crowded together, whether the comparison is made between one town or district and another, or between different portions of the same town or district. Particular occupations and social conditions exercise a greater influence on health and the duration of life than is produced by impure air or insufficient ventilation, but they do not operate in the production of scrofula in the sense of a specific agent or of a direct cause. The general mortality and the deaths from particular diseases bear a close relation to the poverty of the population, and to the vicissitudes, or alterations of prosperity or adversity, to which they may be exposed; while wealth and station, which insure to the more elevated classes of the community abundant food, ample clothing, convenient and well-ventilated dwellings, and pure air, are nevertheless unfavourable to longevity; and the industrious labourer, whose toil insures steady remuneration, and whose temperate habits and provident character insure him the necessaries of life, good of their kind and ample in quantity, is in the condition the most favourable to long life and uninterrupted health. In the last result, then, it is to diseased nutrition, however brought about, that we refer the production of scrofula; an opinion in which there may be some novelty, inasmuch as many authors have assigned to perverted nutrition a powerful agency in developing the disease—especially CARMICHAEL in England, and LEPELLETIER and BAUDELOQUE in France; yet my controversy with BAUDELOQUE consists in a denial of the exclusive agency which he assigns to impure air in deranging nutrition" (p. 239).

51. While the disease is imputed chiefly by Mr. PHILLIPS to insufficient food, the other circumstances which I have viewed as concurring causes of no mean influence, especially a self-polluted or otherwise contaminated air (§38-42), are considered of little importance by him provided that the food is sufficient. It is manifest, however, that his investigation of external scrofula, chiefly with reference to an early age, has led him to overlook the more remote influences of certain causes, which he accounts of little importance. "But the cause of diseased nutrition," he remarks, "at that period of life when the seeds of scrofula are sown, is, in the vast majority of cases, insufficient food or improper feeding; and even if the less direct agencies,

which we have been considering, occasioned scrofula much more frequently than we believe they do, the distinction is of great practical importance, viz., that they do not act in virtue of a specific influence suited of itself to produce scrofula, but as general morbid agencies which impair digestion, and thus indirectly contribute to the production of the disease. That food, insufficient in quantity, or innutritious in quality, stands in the relation of cause to the development of scrofula, more directly than any other morbid agent, is shown by this circumstance, that whenever food is abundant in quantity, and of a sufficiently generous character, scrofula is kept under, that is to say, it is less frequently seen, although other noxious agents are perhaps rife, and the general mortality is great; and that in our rural districts, where the air is probably pure and the occupation healthy, and where the general mortality is small, scrofula is largely developed; because the food, even when abundant, does not contain sufficient stimulus to preserve the frame in healthy vigour. Yet, although we may have no satisfactory proof that a contaminated atmosphere, or any one of the other indirect agencies to which we have referred, will operate so injuriously on the digestive functions as of itself to induce scrofula, I do not the less deplore the influence of those debilitating agencies, which impair the healthy activity, and lessen the proper vigour of large numbers of our countrymen" (p. 241). But that the injurious or indirect agencies which Mr. PHILLIPS considers so little influential, are really of importance as respects the development of external and internal scrofula, both in early life and in more advanced age, I am convinced, although a sufficiency of wholesome food will counteract them to a considerable extent, and especially when an hereditary taint or predisposition is not present.

52. The injurious influence of insufficient feeding in poor-houses, union-houses, in other pauper institutions, and in prisons, has been sufficiently demonstrated by CARMICHAEL, BAILY, PHILLIPS, TYLER SMITH, and others. But it is not to the insufficiency of food alone that the production of scrofula should be imputed, although it may be admitted to be the chief agent. Crowding of the sleeping apartments, breathing an impure or contaminated atmosphere, insufficient ventilation, confinement or deprivation of exercise in the open air, and depression of spirits, co-operate more or less with this more efficient cause. But as in most of the union-houses the inmates have more food than the independent labourer can procure, even when fully employed, it cannot be a matter of surprise to find scrofula more prevalent in some country districts than it is even in some manufacturing towns. In connexion with this subject, Mr. PHILLIPS very justly remarks, that, believing the health of the child and the vigour of the man to depend upon the sufficiency and nutritious character of their food, a still more liberal diet for pauper children than is at present afforded would, at one and the same time, better the health of our population, and be consistent with a sound national economy. The reports of the Inspectors of Prisons furnish numerous instances where prisoners have manifested glandular tumours under the discipline to which they have been subjected, and have quickly rallied under

an improved diet. Dr. Baly states, that a "marked difference, in respect of their general health and the number affected with scrofulous disease, is presented by the convicts sent to the central prison at Millbank from different parts of Great Britain, preparatory to their transportation. By far the thinnest convicts, and the largest proportion of unhealthy and scrofulous individuals, come from the Scotch prisons, in which the diet consists of a sparing allowance of vegetable and farinaceous food."

53. iii. OTHER CAUSES CONCURRING IN THE PRODUCTION OF THE SCROFULOUS TAIN, AND AIDING OR DETERMINING THE DEVELOPMENT OF TUBERCULAR FORMATIONS.—The *causes* which have been here insisted upon are certainly the most influential in the production of latent and developed scrofula and tubercles; *but there are others* which concur with the foregoing either in producing a scrofulous taint or external scrofula merely, or in developing internal tubercles, especially in the lungs, in persons who are already imbued with this taint, and which, when acting energetically, may produce this effect even on those who are not thus manifestly imbued. In this latter case, the causes in question, acting either independently of the foregoing causes, or conjointly with them, or aiding and determining their effects, impair not only the vital energy and vital functions throughout the frame, but also the nutrition of the several tissues, and the intimate condition of vital cohesion and action. Many young persons possessed of a scrofulous diathesis, or who have been the subjects of external strumous disease in childhood, and even some who present no very marked sign of a scrofulous taint, become, as puberty, or early manhood, or more mature age, is arrived at, the victims of tubercular formations in some internal organ, especially in the lungs, owing to the operation of those causes which I am now about briefly to consider.

54. A. *Neglect of exercise in the open air*—of exposure to the light of day and to sunshine—is one of the causes which is most influential in superinducing tubercular formations in the scrofulous diathesis, and even in constitutions which evince no evidence of this taint. The general neglect of the indications suggested by the alternations of night and day; the neglect of repose during the hours of darkness, and of rising and of being employed during the hours of day; the common practice of pursuing our avocations and recreations during a large portion of the time intended by nature for our repose, and of devoting a large portion of the day to sleep, is not without influence in impairing the constitutional powers, in weakening the assimilating and excreting functions, and in relaxing the mental vigour. An early departure to nocturnal repose, and the limitation of this repose to the hours of darkness—the trite maxim of "early to bed and early to rise," &c., is of much greater importance than is indicated by the practice of modern times.

55. B. *Inattention to a due preservation of the cutaneous function* is not without its influence. The imperfect performance of this function, the sudden arrest of it, or the entire suppression of it, however well it may be vicariously discharged by the lungs, kidneys, or intestinal canal, endangers the healthy condition of the blood, and disorders the assimilating processes. It should

not be overlooked, in our pathological speculations, that the cutaneous function is supplemental of other important functions—of the respiratory, of the renal, of the hepatic, and of the intestinal; and that, even when no supplemental or vicarious office may be traced to this function or to either of these other functions, a very intimate relation subsists between them, the due discharge of the one influencing the others more or less. The importance, therefore, of duly regulating this function, guarding against its excess as well as its suppression, by proper clothing and exercise, will be admitted.

56. Among the *dark-skinned races*, a free and even an abundant cutaneous perspiration is most necessary to the continuance of health; and when it is habitually diminished, especially by migrating to a colder climate, tubercles, especially in the lungs, supervene in very numerous instances. A diminution of the accustomed perspiration may not, however, be the sole cause of this liability of the Negro and other dark races to tubercles after migrating to temperate or cold climates. The sedative influence of cold upon the constitution of these races may have a considerable or chief share in the production of this effect, especially in connexion with the obvious want of adaptation of the constitution of these races to temperate and cold climates. Of the *influence of climate* generally upon the prevalence of scrofulous and tubercular diseases no precise data exist. The subject, however, will be adverted to in the sequel, and in the article on TUBERCULAR CONSUMPTION.

57. C. Intimately connected with the foregoing is the *influence of dress and of various physical conditions depending on occupations and habits of life*. Exposure of parts of the frame requiring protection or uniformity of temperature, as the upper regions of the chest, and the hips and lower extremities, to vicissitudes of season and weather, and sleeping in too low a range of temperature, are injurious, the effects being more frequently manifested in the lungs than in any other organ. To restrain habitually the movements of the thoracic and abdominal parietes, by position, by occupation, or by dress, or to otherwise embarrass the function of respiration, is much more injurious than is generally considered. The stooping position, particularly when long continued or frequent; stooping at a low desk or table, especially if a part of the parietes of the chest is brought in contact with, or rests upon, the desk; and, above all, stiff and closely-laced stays or corsets, are among the most injurious agents to which youth or mature age can be subjected, and their effects are most frequently manifested by favouring the development of tubercles.

58. Stiff or unyielding stays prevent the due exercise of the muscles of the trunk, impair their development in early life, and weaken these muscles at later periods. If this article of dress be too closely applied or drawn around the waist, the movements of the ribs are restrained or even prevented; the liver is carried upward, and it invades the thoracic cavity, compressing the lungs and embarrassing the circulation through the heart and large vessels; and the colon is more or less displaced or pressed upon, with the rest of the abdominal viscera. The undoubted consequences of these conditions—consequences which vary in

amount and danger with the cause now assigned—are an imperfect performance of the respiratory, of the digestive, of the assimilating, and of the excreting functions; and ultimately a morbid state of the blood, tubercular depositions, especially in the lungs, hæmoptysis, anæmia, &c.

59. Not less injurious than tight lacing is the practice of wearing unyielding supports in the stays, especially steel supports, which, however well covered, tend to carry the electromotive influence from the frame, and to withdraw a salutary stimulus of nervous power from the system. The importance of attention to this matter is not hypothetical but real, as proved by long and frequent observation, and by the results following the removal of this evil. The more freely the movements of the trunk and spine are allowed to be performed, and the more efficiently the actions of the muscles concerned in these movements are accomplished, the more certainly and healthily will the functions of the several organs contained in the trunk be discharged. (*See art. DISEASE, § 23, et seq.*)

60. *D. Excessive secretion*, and more especially an excess of the recrementitious secretions, or an undue discharge of the latter contrary to the intentions and indications of nature, and particularly the unnatural and debasing vice of masturbation—a vice most generally practiced by prudes, the unmarried, and the sanctimonious—have no mean influence in the production of tuberculosis, especially of the lungs, even independently of the pre-existence of a scrofulous diathesis. The vice now adverted to, and a premature or excessive sexual intercourse, are injurious both by the discharge from the economy of a secretion intended to aid the healthy development of the frame, and afterward to support and to promote the nervous and other functions, and by the frequent and excessive excitement by which this discharge is preceded, a consequent state of languor, depression, and vital exhaustion always resulting.

61. *E. Prolonged mental application*, or exertion, is more or less exhausting to both mind and body, as respects not only its direct operation, but also its indirect influence, especially in preventing a salutary recourse to hygienic measures, and inducing a neglect of exercise in the open air, of change of air, and of the various recreations which tend no less to strengthen the body than to invigorate the mind.

62. *F. An inordinate indulgence of the passions and affections*; the various depressing moral emotions, anxiety of mind, hope deferred; frettings and disappointments, losses of fortune and friends, and all the sentiments which tend to weaken the organic nervous energy and lower the heart's action, more or less affect the digestive and assimilating as well as the excreting functions, lower the powers of life, vitiate the circulating fluids, impair or alter the nutrition of the structures, and thereby favour or develop tubercular formations. But it is unnecessary to pursue this topic any farther, as it is more fully considered in another part of this work (*see art. DISEASE, the Causation of, § 22, et seq.*)

63. III. OF THE PATHOLOGY OF SCROFULA AND TUBERCULOSIS.—Writers on scrofula and tubercular depositions have differed remarkably not

only in respect of the identity of these morbid states, but also as regards the origin, modifications, complications, and various other pathological relations of both. It will, therefore, be requisite to describe, 1st. *The Structure of Scrofulous and Tubercular Matter*—a. as anatomically displayed; b. as appearing under the microscope; and, c. as determined by chemical examination. 2d. To inquire into *The Identity and Dissimilarity of Scrofula and Tubercles*. 3d. To consider *The Pathological Relations, Origin, and Nature of these Maladies*. 4th. *Their Localization or Seats*. 5th. *Their Modifications and Complications*. 6th. *The Comparative Pathology of Scrofula and Tuberculosis*. The discussion of these topics will prove the best introduction and guide to the consideration of the very important subjects of the *prevention and cure* of these very prevailing diseases.

64. I. THE STRUCTURE OF SCROFULOUS AND TUBERCULAR MATTER.—Scrofulous and tubercular matters are peculiar morbid formations, the product of an altered secretion and nutrition of the parts containing them, arising independently of inflammation, although frequently associated with a modified state of inflammatory action, apparently induced by these morbid products. These morbid formations are different, 1st, from the products of ordinary inflammation, occurring in a previously healthy constitution; 2d, from other morbid growths, as shown in the article on Scirrhus and other Morbid Tumours. The scrofulous change, matter, or deposit present various appearances, superficially, according to its stage, its seat, and the alteration of the surrounding tissues; yet it is essentially the same at each of its stages, whether it is formed in a scrofulous external gland or in an internal organ. It varies chiefly in grade or stage, or in the successive changes which it undergoes, and in the form of its infiltration, especially at an early stage. Opinions, however, on these and other allied topics are extremely various, but I shall notice the chief of them.

65. *A. The Physical or Anatomical Structure of Scrofulous and Tubercular Matter*.—(a) As respects *scrofulous or enlarged superficial lymphatic glands*, the difficulty has been to demonstrate the changes which take place at the commencement, or at an early period of this disease. The question to be solved respecting them is whether the tubercular deposit, which is undoubtedly the chief change even in them, is the primary manifest lesion, or whether the increased vascularity often attending this deposit is the primary morbid alteration? This question will, however, be more fully considered in the sequel; but, before it can be entertained, the appearances presented by the scrofulous deposit, in various situations and seats, require to be noticed. The most obvious change in a scrofulous gland is its increased size. LLOYD and SOEMMERING ascribe this enlargement chiefly to thickening and increased vascularity; but it is more certainly owing to tubercular infiltration, in patches and rings, throughout the structure of the gland. The gland often remains in a stationary condition for a long time, presenting a granular yellow tuberculization, with little or no increase of vascularity, and with a permeable state of the vessels. But as the morbid deposits augment, the vascularity of the gland

itself diminishes, or is gradually obliterated, owing to the pressure of the infiltrated matter, although the vascularity of the cellular tissue surrounding the gland is increased. BREDOW considers that the vessels found early in scrofulous glands belong to the tissue of the gland itself, and not to the scrofulous deposit in it.

66. Tuberculous matter, then, is infiltrated in the tissues of a gland, organ, or part. Sometimes traces of those tissues may still be recognised in the tubercular mass. It is only in such cases that any appearance of blood-vessels can be traced, the vessels being merely those belonging to the infiltrated tissues. In other cases, the tissues, being more and more compressed by the increase of the tubercular matter, almost or altogether cease to be distinguishable, and nothing is to be found but a homogeneous mass of this matter. In some instances, the mass is isolated by degrees from the surrounding living parts, and a cyst becomes formed around it, as is formed around pus or any foreign body. Here there is a close analogy between the formation of pus and tubercular matter, either of which being infiltrated into the tissues of the part in which they are found, and afterward becoming isolated by impacting the tissues around them into a cyst. According to MECKEL (*Pathol. Anatomie*, 2ter Bd., 2ter Th., s. 370) the encysted state of tubercles is more frequently met with in the lower animals than in man.

67. KINGSTON, THOMPSON, and LUGOL, however, maintain that they have recognised blood-vessels in tubercles; but CANSTATT remarks, that SEBASTIAN explains this rightly in viewing it as a mistake, arising from the circumstance of tubercular matter being sometimes deposited on a small blood-vessel without giving off a branch to this deposit. ANDRAL, ROCHOUX, CARSWELL, CANSTATT, and others agree in asserting that lymph-vessels do not communicate with the scrofulous deposit.

68. MM. BARTHEZ and RILLIET infer, 1st. That, when a lung contains gray granulations isolated from one another, an injection penetrates easily by the bronchi and by the pulmonary arteries and veins; 2d. That the vascular network which surrounds the granulations communicates very evidently with the pulmonary artery, and probably not with the vein; 3d. That the bronchial injection surrounds on all sides the gray granulation, and conceals it in part only: it is not disposed in very fine ramifications similar to a vascular lace-work, but in little grains united to one another; and, 4th. That perhaps the bronchial injection can penetrate the granulations. As respects the semi-transparent, gray infiltration, they state that there the veins and pulmonary arteries are very penetrable by injections, while the small bronchi are obliterated, which latter fact is similar to what is observed in pneumonia. These observations, however, do not prove the vascularity of tubercular deposits, but rather that this deposit, as respects the lungs, often takes place in the vesicular structure or air-cells of the organ, as supposed by MAGENDIE, CRUVEILHIER, CARSWELL, ANDRAL, and KINGSTON. That the vessels become obliterated with the progress of tubercular infiltration, is contended for by GUILLOT and CANSTATT, according to whom the tubercle itself is always non-vascular, but

around the mass, or around the cavity left by it, an infiltrated layer of gray matter exists, which obliterates the vessels in the space that it occupies.

69. Dr. GLOVER remarks on this topic, that these facts and observations, taken together, lead to the conclusion of the vascularity of tubercle being a non-essential phenomenon; and that the obliteration of the vessels of the tissue into which the scrofulous or tubercular matter is effused may be carried to a greater or less extent. And it farther agrees with my own observations, that the irritation produced by the infiltrated matter in the surrounding tissues may cause either increased vascularity, or in some instances obstruction of the vessels; and that the enveloping tissue of the tubercular mass may thus be either more or less vascular or devoid of vessels; but that tubercular matter is itself non-vascular.

70. The tubercular deposit, whatever may be its seat, may be viewed as a small tumour or tubercle, varying remarkably in size, from that of a small pin's head to that of an orange; and in colour from a grayish, semi-translucent hue to a yellowish white or grayish yellow, commonly of a round form, at first firm but friable, afterward being transformed into a heterogeneous matter consisting of whitish, curdy masses, and a sero-puriform fluid. When the tubercle is changed to this state, it generally gives rise to an ulcerous cavity, which extends more or less rapidly in every direction, sometimes remains stationary for an indefinite period, and, in much rarer cases, becomes cicatrized, or covered by a sero-fibrous lining.

71. (b) Much discussion has arisen as to the earliest recognised form and appearance of the tubercular formation. M. LAENNEC conceived that the white opaque corpuscle, constituting tubercle, is preceded by a grayish, semi-transparent granule, in whose centre is developed a whitish point, which by degrees extends to the surface and involves the whole substance of the granule, so that the granule is really the first stage of tubercle. Dr. BARON and M. DUPUY believed that tubercles originate in a transparent vesicle. M. ANDRAL has endeavoured to ascertain the accuracy of this opinion, and he states that it is quite certain that, in some few cases, small, round, transparent vesicles, filled with a serous fluid, are found along with undoubtedly genuine tubercles of various sizes in the lungs of the horse; but that he has never been able to find this appearance in the human subject, excepting in one solitary case. He has sometimes seen the fluid contained in these vesicles in the horse lose its transparency and become turbid, and the entire vesicle thus assume the aspect of the opaque, white tubercles around it. From this M. ANDRAL infers that the transparent vesicles found in rare cases among tubercles are only accidental productions, with which the latter are complicated; that they cannot be considered as the early stage of tubercles; and that, although they occasionally seem to secrete a matter similar to that observed in the early stages of tubercles, yet this does not prove identity.

72. M. ANDRAL farther contends that the original form of tubercle is not a serous vesicle, nor a grayish semi-transparent granule, as LAENNEC maintained. The opinion of this latter pa-

thologist respecting the origin of tubercles in granulations has led to the notion that the small, grayish, irregularly-rounded bodies sometimes found studding the free surface of serous membranes are incipient tubercles. M. ANDRAL, however, more correctly views them as the mere rudiments of false membranes; and a similar mistake has been made in considering as incipient tubercles those grayish granules sometimes found in mucous surfaces, which seem to be merely mucous follicles in a state of enlargement. The identity, therefore, of the granulations found in different organs and surfaces with tubercles is not proved, although those granulations are frequently complicated with tubercles, and may secrete tuberculous matter as they may secrete pus.

73. M. CRUVEILHIER has advanced another opinion, namely, that before the occurrence of tubercle as a hard body, and at an earlier period, it may be detected in a fluid puriform state. MM. TROUSSEAU and LEBLANC have, as well as CRUVEILHIER, found among well-formed tubercles clusters of points, in some of which was a purulent infiltration, in others very small abscesses. M. ANDRAL has seen, in a few cases, a similar appearance; but although those facts seem to offer some confirmation to M. CRUVEILHIER's opinion, yet the same objection applies to it as I have already adduced. It is probable that tubercles are secreted in a fluid state, but the fact is not demonstrated; and, however small tubercles may be, they are always found in the solid state. I have observed these bodies in the lungs of very young infants, and of the fœtus at the full time—where they are extremely rare; but they have always presented the solid or consistent form.

74. It may be granted, as contended by M. ANDRAL, that tubercles are in their first stage when they appear as minute, opaque, friable, rounded bodies of a yellowish-white colour, and without any trace of organization or texture. But this is not the only form in which they may commence. Besides these *yellowish miliary tubercles*, there is another form, which, since the appearance of the writings of BAYLE, has been the subject of much discussion, namely, the *gray, semi-transparent granulations*, which, according to LAENNEC and LOUIS, are the first degree of development of tubercle, the miliary yellowish tubercle being only a transformation of the grayish granulation. This is, in fact, confirmed by microscopic observation by LEBERT (§ 85). The gray granulations, transparent towards their margins, and sometimes also at their centres, often show in this latter situation a point more opaque and yellower than the rest. They are not surrounded by any envelope. They do not constitute the necessary and constant origins of fully-developed tubercles, but are only one of *two forms which these bodies assume at their commencement*, the yellowish miliary tubercle often commencing as such, and sometimes being a transformation of the grayish granulations. Tubercle may, therefore, at its commencement, present either of these forms; or it may appear as a gray and yellow infiltration, as a gelatiniform infiltration, or as tuberculous dust, according to French pathologists. It was supposed that the gray granulations occurred only in the lungs; but it has been shown by MM. VALLEIX,

PAPAYOINE, NELATON, and others, that they are found also in other organs.

75. In scrofulous meningitis gray granulations and yellow particles are observed, as in the lungs. The former may also be detected in the glands, especially in the mesenteric glands, and between the coats of the intestinal canal. BARTHEZ and KILLIET, also, view the gray granulation as a form of incipient tubercle, not peculiar to the lungs, but existing occasionally in other organs, as under serous membranes, in the spleen, kidneys, liver, lymphatic glands, &c. It is chiefly developed in the cellular tissue, especially that connecting serous or other membranes to adjoining parts, and is often produced by congestion or by a mechanical hyperæmia. It is not improbable that the gray and gelatiniform infiltrations of LAENNEC are early stages of tubercular formations. The gelatiniform infiltration may pass into a gray infiltration, and this latter into a gray granulation, which may or may not go on to the state of yellow tubercle. The tubercle-grains, whether yellow, miliary, or semi-transparent granulations, are most separated and scattered when small, or at an early stage of development. As they increase in size they often become confluent. In the lungs more especially, they present every grade or stage both of change and development. There are often found, even in the same subject, the gray or semi-transparent granulation, rarely alone, but usually accompanied with yellowish granulations; the same miliary tubercle, quite yellow and caseous; tubercles much larger; masses more or less softened, or even craccaceous cavities, &c. In many cases death supervenes before a large proportion of the minute grayish tubercles, or granulations, has reached more advanced phases of their growth or progress. In many instances, grayish granulations are found as the commencement of tubercular disease in one organ, and the yellowish miliary tubercle in another organ or part. It is not rare to find in young children the latter in the sub-arachnoid cellular tissue, and the former under the pia mater. Gray granulations are often found in the sub-pleural cellular tissue, and yellowish tubercles in the lungs.

76. (c) *Gray granulations* are found to possess the globules of tubercle from their earliest appearance (see the microscopic appearance of tubercles, § 81), and may exist in every part in which tubercle has been detected.—*b*. They are not a product of inflammation, although they may be found in inflamed structures.—*c*. They are most abundant and most frequent in the lungs and in the pia mater.—*d*. They are sometimes accompanied in the lungs with a dark or melanotic secretion.—*e*. When death does not take place early, they generally pass into the form of *yellowish tubercles*, by the destruction of the fibrils which separated their constituent elements and by the progressive deposit of the tubercular matter.—*f*. *Tubercles* do not necessarily commence in the grayish semi-transparent granulations, but also as frequently commence as yellow and opaque miliary tubercles.—*g*. In the same body both these forms of commencing tubercle are not unfrequently found, not only in different organs but even in the same organ.

77. (d) *Growth*.—Besides the transformation

already stated (§ 70), and previously to it, tubercles experience an *increase of bulk*. It seems important to ascertain how a body of the size of a small pin's head may acquire the bulk of a small orange. To account for this remarkable development, it has been supposed that this morbid production has the power of living like organized beings—of growing by intussusception. But if this were the case, it would show appearances of organization and vascularity: now, however large the tubercular mass may be, no trace of either the one or the other can be detected in it. We can, therefore, view this formation merely as a morbid secretion, which, having once commenced, continues, the deposition of the particles of tuberculous matter separated by the vessels from the blood increasing the mass.

78. (c) The *softening* of tubercles, or the puriform transformation of them, seems to arise from the circumstance of their acting as foreign substances on the surrounding tissues, the tubercular matter exciting a secretion of sero-puriform fluid from those tissues. This fluid divides mechanically the tubercle, and changes it into the state usually termed that of softening. The tubercular matter being once secreted in the tissue of an organ or part, thus becomes, after a time, a source of irritation to the vessels of the tissue in contact with it; and the consequence of this is the effusion of a fluid secretion which breaks down the tubercular matter. The semifluid matter thus formed tends to perpetuate and to increase the irritation of the surrounding tissue, and necessarily leads to a solution of continuity by which a way is opened for the escape of the tubercular matter, as in the case of a foreign body. But even after this has been accomplished, the morbid process excited in the surrounding texture generally continues. This theory of the softening of tubercles does not differ materially from that adopted by MM. LOMBARD AND ANDRAL. After the expulsion of the tubercle has been accomplished, the process of suppuration may continue, and, moreover, the same cause which had produced the tubercle before may produce it again; the same process which eliminated it may contribute to the renewal of its formation; so that, far different in this respect from a foreign body introduced from without, the tubercle may be indefinitely recreated simultaneously with the pus destined to produce its discharge. It has been asserted by ROKITSANSKY, MR. RAINEY, and several pathologists, that the softening of tubercles always commences at their centres: this is certainly the case in many cases; but the process may also begin in other parts, and particularly towards their surface. When it commences in the centre, it may be imputed to a decomposition taking place in those molecules of the mass first deposited and farthest removed from the surrounding living tissues.

79. (f) In rarer instances tubercles, in place of being softened, acquire unusual hardness, and are transformed into a firm, gritty mass, in which a considerable quantity of the phosphate and carbonate of lime is found upon chemical analysis. These salts likewise exist in the softened, as well as in the early stage of tubercles, but in much smaller quantity. The transformation of the tubercles into a harder

substance seems to proceed from an absorption of a considerable portion of the animal matter of which they chiefly consist. M. THENARD found tubercles, in their primary or unsoftened state, to consist, in 100 parts, of 98.15 of animal matter, of 1.85 of the muriate of soda, phosphate of lime, and carbonate of lime, with a trace of oxide of iron; while those tubercles which had undergone the cretaceous transformation presented inverse proportions of those substances; that is, in 100 parts, of 3 of animal matter, and 96 of saline matter.

80. The *cretaceous transformation* occurs most commonly in those cases where the tubercles have long ceased to exert any hurtful influence on the constitution, this being the reverse of the purulent transformation. This change has been demonstrated to me in several cases, three of which occurred in medical men. I shall briefly allude to one case, as having lately come before me. A young man, about twenty, evinced symptoms of incipient phthisis, for which he was recommended to visit the Mediterranean. After being abroad for several years, he returned to London in a tolerably good state of health. I attended him some time afterward for an attack of partial bronchitis, during which he expectorated two or three cretaceous masses, evidently transformed tubercles. He recovered, travelled abroad, and returned again to this country, where he continued for a considerable time in apparent health. He was afterward attacked—about twenty years subsequently to the appearance of phthisical symptoms—by an acute disease, of which he died. Upon examination, a considerable number of cretaceous tubercles were found in the lungs, which were not otherwise much diseased. We may generally infer that, when symptoms have announced the presence of tubercles, and have subsequently disappeared, the patient continuing afterward to enjoy tolerable health, the cretaceous transformation of the tubercles has taken place. M. ANDRAL states, that he has occasionally found, surrounding the cretaceous tubercle, a tissue that appears shrunk, and occupies less space than in the healthy state; indicating that, in some cases at least, this tissue has actually been in part destroyed and absorbed, along with a tubercular mass whose remains appears as a calcareous concretion. This inference is farther confirmed by the fact of tubercles being sometimes found, even in the softened state, containing hard, gritty particles, formed of phosphate of lime, mixed with the curdy masses floating in the puriform fluid.

81. Tubercles being produced from a morbid state—whatever kind that may be—of the nutrition, and interstitial exhalation constantly going on in the different organs of the body, it follows that they may be developed in any one or more of them. As to the particular tissue in which this morbid exhalation or secretion takes place, some doubt may be entertained. The very general diffusion of tubercles and other considerations indicate the cellular tissue, either free or combined, as its seat; but although this tissue may be the most common, it is not the only seat of this secretion. It should, however, be stated that Dr. BARON refers it to the radicles of absorbent vessels, and some circumstances seem to support his opin-

ion. M. ANDRAL remarks on this topic, that "the submucous, subserous, and intermuscular tubercles are evidently developed in the cellular tissue. It would be difficult to prove that the same holds good of tubercles of the spleen; and we can admit it only by analogy in those of the brain, liver, kidneys, testicles, and lymphatic glands." As to the lungs, we may readily detect tubercles in the substance of the cellulo-vascular tissue which forms the parietes of the air-vesicles, and the extremely small bronchial tubes opening into them. An apparently tuberculous matter, he adds, has been found in the interior of cavities lined with mucous membranes, without the presence of ulceration. This rare occurrence leads to the inference that tubercles may be secreted in other tissues than the cellular; and proves that, as they arise from a morbid state of the interstitial exhalation constantly proceeding in the different organs and tissues of the body, they cannot be referred to a single tissue or system merely, however generally diffused through the body such tissue or system may be.

82. *B. THE STRUCTURE OF TUBERCLES AS DISPLAYED BY THE MICROSCOPE.*—The lower microscopic powers furnish but little information as to the intimate structure of tubercles, and those who have employed the highest powers differ as to the most important topics connected with this subject. Even the results published at different times by the same observers differ remarkably. Thus CANSTATT states, that "every trace of organized structure is wanting to tubercle-matter; vessels which have been observed in it either belonged to false membranes developed in its bounds, or were the remains of tissues accidentally destroyed." And he adds, that, "microscopically observed, the peculiar fine tissue of organized bodies, growing by intussusception and composed of cellular cyto-blasts, is wanting to tubercle-matter. A mass, composed, in great part, of imperfect cells easily broken down, is only distinguished. As the tubercle deposit increases from without, the tubercle grows by apposition, and in this way increases from tubercle-molecule to tubercle-mass, formed of layers placed concentrically. The outer layers more recently deposited consist of a more transparent matter. This mode of growth forms an essential distinction between tubercle and idioplastic parasitical formations, which increase, like organized beings, by intussusception, while tubercle grows more like inorganic bodies." But CONSTATT afterward states that, contrary to his earlier view of cell-formation being wanting to tubercles, he has since convinced himself of the existence of cells, as VOGEL describes them; and he recalls what he had formerly said about the amorphous condition of tubercle. He adds, that "SCHARLAN describes the tubercle grains as an accumulation of minute corpuscles about the 1/2000th of a line in size, which in many situations form a dark, blackish-gray granulated mass; and that GLUGE and CERUTTI give a similar description. The observations of KUHN as to the papillary appearance of tubercle under the microscope rest on an illusion. The peculiar bodies, described by GRUBB in tubercular sputa, as consisting of whitish-yellow lenticular, round, or oval corpuscles, from one to ten times larger than pus-corpuscles, of a darker yellow, and of

concentric layers, are not confirmed according to others, and appear to have been a misconception. Tubercle consists, at its commencement, according to I VOGEL, of an amorphous mass, which almost disappears in acetic acid, and even in ammonia, and in which the rudiments of cell-formations are already found; this mass gradually passes wholly into tubercle-cells, of very different sizes, from the 1/80th to the 1/400th of a line, and of different forms." VOGEL farther states, that these cells are either rounded, or oval, or long, or drawn out, tailed, or string-like, irregular, &c., with very pale walls, with nuclei which are larger in the small cells, smaller in the larger; and that they often contain fat granules, or granules of dark pigment. The walls of these cells become more transparent, or wholly disappear by means of acetic acid, while their nuclei remain unchanged. Both the cells and the nuclei are destroyed by ammonia. VOGEL, notwithstanding, agrees with VERRER in considering that, although the presence of cellular bodies is proved in tubercles, these bodies may be distinguished from the usual formative cyto-blasts; the organic elements found in tubercles being rather the rudimentary portions or altered remains of other tissues, than independent bodies.

83. The individual corpuscles of tubercle are, according to RUETTE, composed of an integument and a nucleus, and are rather larger than blood-globules. BREDOW says that he could find no integument to the corpuscles. SCHERER found the firmer or outer portion of tubercle to consist of a multitude of little granules and nuclei mixed with a few irregular larger cell granules, but no fibrous structure, nor free fat corpuscles. The softened inner portion contained nuclei of granular corpuscles, which were as large as the round nuclei of the more solid outer part. GERBER asserts that tubercles consist almost entirely of granules, from 1/2000th to 1/200th of a line in diameter; but that, with the granular matter, nucleoli, nuclei, or cells are mingled in a quantity in proportion to the amount of fibrin which the exuded fluid contains.

84. Mr. GULLIVER states, in his edition of GERBER, that tubercular matter consists "chiefly of irregular corpuscles and cells, with oblong and circular nuclei;" and that it is "void of regular structure, being composed of shapeless fragments, and a granular matter formed of minute spherules very variable in size." In Mr. PHILLIPS's work he is quoted as follows: "In the human subject, it appears to me that crude tubercular matter, from whatever organ obtained, differs as little in its microscopical as in its general and chemical characters. When examined by the aid of the microscope, crude tubercular matter can scarcely be said to present any regular structure, as it is merely made up of minutely granular matter, oily spherules, some shapeless aluminous flakes or shreds, and a few irregular corpuscles; the latter are probably nothing but effete, or shrunken primary cells" (p. 41).

85. M. LEBERT remarks, that tubercles present microscopical elements proper to themselves, and distinguishing them from all other morbid products. In this respect they obey the general law, that all existences which are really different pathologically differ also in respect

of molecular composition. Tubercles, according to M. LEBERT, contain a great quantity of molecular globules, varying in diameter from 1-1600th to 1-800th of a line, a hyaline substance which unites their elements, and a species of corpuscle which gives them a peculiar character. These corpuscles are of irregular angular form, vary in diameter from 1-200th to 1-300th of a line, and generally present a well-defined edge. Their interiors are yellowish, slightly opaline, and often contain molecular granules distributed through their substance: they never contain true nuclei, which are so common in cancerous globules, and so constant in those of pus. Acetic acid, which renders the latter transparent, and displays nuclei within them in a very distinct manner, renders the tuberculous corpuscles also more transparent, without disclosing true nuclei in them. If water be added to the tuberculous corpuscles to make them float, their form is seen to approach that of an irregularly polyhedral sphere, instead of being flattened like the globules of pus or cancer. They are numerous, and present so many superimposed layers in the best microscopical preparations, that it is necessary to have observed them repeatedly, and with a clearly defining magnifying power of from 400 to 500 diameters, in order to acquire an accurate notion of their characters.

86. The ordinary element of tubercle, according to Dr. GLOVER, in whatever situation this deposit may occur, is the granular corpuscle. "Many tubercular masses are composed almost wholly of this matter, which varies in size from about the bulk of a blood-globule to about, perhaps, 1-1000th of an inch in diameter. These corpuscles are generally of a somewhat yellowish colour; and when magnified by the highest power (610 diameter), show, occasionally, spots in their substance, which may possibly, in some cases, be nuclei." Mixed with these, which he believes to be in some instances altered cells, in other cases new formations, there are the following elements: 1st. Epithelial scales, variously altered, observed in lung-tubercle; 2d. Fat globules; 3d. Crystals of salts; 4th. Portions of the destroyed tissues, which sometimes assume singular shapes; 5th. Cells, which also appear to belong to the old tissues; 6th. Large granular and corpuscular masses of the most irregular forms. The description of tubercle by Dr. J. HUGHES BENNETT has been adduced at another place. (See SCIRRHUS AND OTHER GROWTHS, § 71.)

87. Microscopical examinations of tubercle and scrofulous matter have also been made by Mr. DALRYMPLE, and published by Mr. PHILLIPS, as follows: "The whole material is composed of disintegrated tissue; granular molecules; irregular exudation corpuscles, in which the nucleolus is seldom to be recognised; and a considerable quantity of oil globules, which may be abstracted by boiling in ether, and recovered by evaporation on a plate of glass.

88. The following remarks of Mr. DALRYMPLE are diagnostic of tubercular matter, inasmuch as they distinguish this matter from the *pus-globule*, and from the exudation corpuscle: "In acute or chronic inflammation of the glands, in otherwise healthy subjects, in whom no particular morbid disposition exists, the *exudation corpuscle*, by what appears a law of vitality, proceeds

to the development of a cyst around the nucleus or cytoblast; and this nucleus even splits into two or more, and hence a *pus-globule* is formed. At this point, however, the process stops, and the *pus-globule* subsequently disintegrates, and is resolved into granular and fluid matter. During the development of the cell and fissure of the nucleus, a *pus-globule* may be said to be an organic and vitalized body, deriving its means of increase from the blastema around.

89. "The *exudation corpuscle*, however, is capable of a much higher degree of organization; and, under favourable circumstances, the cell-germ produces its cell; the cell elongates, and either fibre or filament is produced, as in the healing of a wound.

90. "In *scrofulous matter* it appears that the exudation corpuscles do not possess even that feeble power which induces the farther change into pus, and therefore it passes from the nucleolated cytoblast into an irregular granular body (disintegrated), the elements of which, by some farther chemico-vital process, resolve partially into oil or fat globules" (p. 40).

91. C. THE CHEMICAL COMPOSITION OF SCROFULOUS AND TUBERCULAR MATTER.—M. SIMON remarks, that chemical analysis has hitherto thrown very little light on the nature of *tubercle*, or on the mode of its formation. A tubercular mass, analyzed by PREUSS, contained 19.5 of solid constituents, and 80.5 of water; the former were composed of a substance resembling casein in its relations towards acetic acid and heat, a fat containing cholesterin, and a very small quantity of salts. SCHERER, according to Dr. DAY, states that crude pulmonary tubercle yielded little fat or extractive matter, showing that the morbid process was not far advanced. An ultimate analysis, after the most careful removal of salts and foreign constituents, gave:

Carbon.....	53.888	{ which corresponds with the formula C 43, H 35, N 6, O
Hydrogen....	7.112	
Nitrogen.....	17.237	
Oxygen.....	21.767	

Hence tubercle in a crude state may be regarded as *protein* (C 48, H 36, N 6, O 14), from which five atoms of carbon, one of hydrogen, and one of oxygen, have been removed. SCHERER has made several other analyses of tubercles from different parts of the body; but they differ as little as, and sometimes less than, the above from the composition of protein. (See Dr. DAY'S Transl. of SIMON'S *Animal Chemistry*, vol. ii., p. 480, &c.)

92. GUETERBOCK has also analyzed tubercles from the neck, from the bronchi, and from the lungs; and he states that they contain, 1st. Albumen in small quantity; 2d. Pyine, differing from casein; 3d. Phymatine, a species of osmazome, which, according to him, is proper to tubercles, and which is soluble in water and in alcohol, is precipitated by the acetate of lead, but not by galls, nor by the solution of the sulphate of copper; 4th. Fatty matter, not only cholesterin, but also saponifiable fat. As to phymatine, a principle which GUETERBOCK says is proper to tubercles, its existence requires to be proved by other analyses. Tubercular matter has been chemically examined by BOUDET, HECHT, and others, but the analyses of PREUSS and SCHERER appear to be most satisfactory,

and to them M. LEBERT has given the preference.

93. ii. THE BLOOD IN SCROFULA AND TUBERCLES has been long considered popularly, and with much truth, to be of a poorer quality than in healthy constitutions. SIMON states, that the blood is deficient in solid constituents, especially in fibrin and in corpuscles. The primary causes are probably due to a deficient formation of chyle, and to the influence of a most unhealthy atmosphere. According to DEBOIS, the blood of scrofulous subjects coagulates slowly, the clot is small, soft, and diffuent; the serum is thin, and often a reddish colour. Under the microscope, some of the corpuscles appear devoid of colour at the edges only, some entirely colourless. Their size is not materially changed, but they appear flattened, spherical, or cylindrical. Hence he infers that there is a deficiency of the salts in the blood of scrofulous persons. Mr. PHILLIPS remarks that, in every case in which he examined the blood of scrofulous subjects, the coagulum was relatively small, the serum large; the clot unusually soft, almost diffuent; in a few instances only it was tolerably firm. In most cases the proportion of globules was considerably under the healthy standard. The fibrin had not generally undergone much change. He states that there was in most instances a considerable increase in the proportion of albumen and of the salts, the latter being in some cases nearly double.

94. The state of the blood now mentioned certainly exists, as far as my own observation has extended, especially the deficiency of red globules and the increase of albumen. I have not found any diminution of the salts; but the fibrin has varied with the state of vascular action, an increase of this action and the association of inflammatory action with the scrofulous or tubercular lesion augmenting the quantity of this constituent. As external scrofula becomes more and more chronic, and as suppuration or ulceration continues, the blood becomes more watery and poor, the red globules diminish, and the clot is more soft. These results are also observed during the advanced stages of internal tubercles, as shown more fully when treating of *Tubercular Consumption*. The changes in the blood are well described in Dr. GLOVER's work on Scrofula, to which I refer the reader.

95. iii. THE STATES OF THE SECRETIONS AND EXCRETIONS in scrofulous and tuberculous persons have not been satisfactorily investigated; and unless in protracted and in the most severe cases, they probably do not present any very obvious changes from those usually observed even in healthy persons.—(a) The frequency of a fatty state of the liver in persons who have died of scrofulous disease or of tubercular consumption, has been imputed by some to a deficient secretion of bile, and to the circumstance of the bile containing a much less quantity of its fatty constituents, which are not separated from the liver by means of its secreting function. But the changes, whatever they may be, which exist either in the liver, or in the bile, or even in the chyle, are to be imputed chiefly to the previous alterations of organic nervous energy, to the state of the blood, especially in respect of the amount of red globules, and to the amount of function performed by the lungs.

96. FISCHER and DISSE contended that scrof-

ulous persons suffer from disordered states of the gastric secretions; and the existence of a specific scrofulous dyspepsia was not only asserted, but minutely described, by certain recent writers, who considered this supposition not merely a remarkable distinction, but as an important discovery. That the gastro-intestinal secretions should be changed more or less from the healthy condition throughout the course of scrofulous and tubercular affections, cannot be doubted. Organic nervous power, upon which secretion, assimilation, and nutrition are chiefly dependent, is more or less impaired in scrofulous constitutions; and hence the digestive and relative functions must necessarily be co-ordinately disordered, whenever the usual causes of disorder of these functions are in operation. As organic nervous energy is more and more weakened, and as the blood becomes thinner, or poorer, or more watery, owing to the consequent impaired digestion and assimilation, the usual phenomena attending these states of disorder may be expected to appear from even the slightest causes.

97. (b) The state of the urine in scrofula has been investigated by CANSTATT, DISSE, and GLOVER, but they have remarked no definite change in this excretion when the urinary organs are not especially implicated, and when the functions of the skin are not materially disturbed. When, however, these functions are either impaired, or arrested, or, on the other hand, much increased, the urine is generally vicariously changed accordingly, not merely in quantity, but also as respects its ingredients; much, in either respect, depending upon the nature and amount of the ingesta.

98. According to SIMON, the urine of children of the scrofulous diathesis differs in the majority of cases from the normal state. It is usually pale, but becomes deeper-coloured when there is vascular excitement. Its specific gravity is lower than in health, and it is often much more acid than the urine of children usually is. SCHÖNLEIN states that the principal changes in the urine of scrofulous persons consist in the diminution of the nitrogenous constituents—the urea and uric acid, and in the appearance of the non-nitrogenous oxalic acid, and occasionally, but more rarely, of benzoic acid. The acids are frequently so abundant, that the urine, upon cooling, deposits copious sediments of the oxalates, and these sediments sometimes form renal and vesical calculi. The frequent occurrence of oxalate of lime or mulberry calculus in children is well known. Dr. PROUT has remarked, that half the stone-cases occur before the age of full puberty.

99. iv. THE PATHOGENESIS OF SCROFULA AND TUBERCULOSIS.—A. The operation of the causes above described, either singly or in succession, or more or less in combination, is manifestly such as tend to *weaken the organic nervous energy*, and thereby to depress the digestive, the assimilating, the nutritive, and consecutively the depurating or excreting functions. The organic nervous system actuates these several functions, and is itself influenced by the physical agents which perpetuate animal existence—by external agents, and by the ingesta. The causes which have been now considered, whether those acting on the parents of the scrofulous subject, or upon the scrofulous individual himself at a

very early age, or even at later periods—whether external or internal—whether hereditary, congenital, or acquired—have all a similar tendency, namely, directly to depress, or to exhaust organic nervous or vital power; and thereby to impair vital resistance, to prevent the processes of repair consequent upon morbid vascular action, and to arrest the formative or organizing tendency of the exudations produced by this action. Not only is there a disposition to a dyscrasy—to a solution of vital cohesion, observable in parts the seat of scrofulosis, but there is also an absence of the formative effort in the fluids exuded by morbid actions in scrofulous constitutions. The state of vital power or endowment in the several tissues or organs of scrofulous persons, appears insufficient both for the healthy or sthenic actions or functions these parts should perform, and for the organization of the fluids or matters effused from their vessels. Hence the changes which the exuded matters undergo neither favour, nor are followed by, organization, even in its lower grades; and, most probably, the fluid itself is exuded from the capillaries of a kind and in a state which indisposes it to organization. It consequently undergoes changes independently of any formative tendency, these changes being chiefly those of increase by aggregation of the tubercular molecules, until the irritation produced by the morbid deposit affects the enclosing tissues, and thereby favours the progressive changes produced in this deposit, as mentioned above (§ 78).

100. It must be manifest that, admitting the more immediate and direct operation of the causes of scrofula on the organic nervous system, and through this system upon the functions which it actuates, the blood itself necessarily must be, sooner or later, or even from an early period of the action of these causes, most materially altered; and thereby become furnished with the elements of the morbid materials, or even with these materials themselves, which are deposited in certain parts in preference to others, owing to the states of organic nervous or vital power in these parts. That the blood is actually so changed is not very demonstrable in many instances, especially early in scrofulosis, or where the scrofulous taint only exists; but that it is more or less changed, in the majority of instances, even in these, is made evident by careful inspection and by chemical analysis, the secretions and excretions ultimately becoming more and more altered. It has been repeatedly shown, that not only is organic nervous power more or less weakened, but the blood, also, is manifestly thinner, or poorer as respects the amount of red globules, and even otherwise altered. Thus the organic nervous influence in the first place, and the circulating fluids in the second place, are the prime factors of both the scrofulous taint, and of the more diseased grades of this taint, as manifested by external or internal tuberculosis.

101. *B. The origin and source of scrofula and tuberculosis* may be readily inferred from what has been advanced above as to their causes, and as to the operation of these on the organic nervous power, on the digestive and assimilating functions, and upon the blood and vascular system generally. When it is considered that the

state of the circulation in the capillaries, the changes of the blood in them, and the exudations which take place from them, are controlled most remarkably by the organic nervous influence, it will be admitted that to this influence or power the primary morbid change should be imputed; and that, in whatever tissue or part this power is the most impaired, or most languidly exerted, or most depressed by external or physical causes, or by internal ingesta, or most affected by hurtful agents, in these tissues, parts, or organs will this primary change of nervous power affect the capillary circulation as respects not only the state of the capillaries themselves, but also as regards the conditions of the blood they contain, and of the exudations from them. While, therefore, the origin of the scrofulous taint may be ascribed to the organic nervous system, and to its influence upon the digestive and assimilating functions, the source of the morbid deposit may be traced to the state of the blood, and to the exudation which takes place from the capillaries in the seat of lesion.

102. *C. The nature of the changes constituting scrofula and tuberculosis*, must be manifest from the character of the causes which produce these changes primarily in the organic nervous system, and consequently in the assimilating functions and in the blood itself. These changes are, as respects this system, a state of depression, or of weakness, or asthenia; as regards the assimilating functions, a state of impairment or insufficient action; as respects the blood, a deficiency of red particles, and an increase of albumen; and as regards the capillary circulation, a languid condition, amounting to congestion in some organs or parts, and varying in grades of passiveness, and occasioning an exudation or deposit of the morbid matter of tubercle in the tissues, whose capillaries are thus more especially affected.

103. *V. AS TO THE STATE OF VASCULAR ACTION PRODUCING TUBERCLES*, much discrepancy of opinion exists. There are, however, three well-ascertained facts connected with the origin of these bodies, calculated to lead to an accurate opinion on the subject: 1st. Their frequently simultaneous formation in different organs; 2d. The very frequent absence of any appreciable symptoms of antecedent excitement, increased action, or congestion of the capillaries of the part in which they originate; and, 3d. Their very general origin in states of the frame remarkably characterized by deficient vital energy and by imperfect development; and consequently upon causes, as shown above (§ 99, *et seq.*), which, as respects both the parents and the offspring, depress or exhaust vital power and sthenic action, and impair the assimilating and nutritive functions.

104. *(a) The presence of tubercles in several organs at the same time* has been explained by supposing that the tubercular matter has been absorbed from the original seat of its formation, introduced into the circulation, and re-secreted or deposited in the parenchyma of other organs, the case being the same with tubercular matter as with pus. I will not deny the possibility of this occurring; but there is no decisive proof of it. Besides, this can hold good only with regard to the consecutive formation of tubercles, and not in respect of their simultaneous occurrence in distant organs. It would be more con-

sistent with the close observation of the phenomena of their origin to refer the latter, and even the former mode of their production to defective vitality of the capillaries, and to a modified state of the exhaling function these vessels are constantly performing in the different structures; this function being modified by the defective state of vital endowment of those vessels. The general diffusion of this primary morbid condition—this constitutional taint—will account for the simultaneous, as well as for the consecutive affection of several organs; the varied conditions of the textures and organs occasioning the diversities which are met with in respect of frequency of liability of each, the succession of attacks, and various other peculiarities occasionally met with.

105. (*b*) *The localization, or the origin of tubercles locally, has been ascribed to inflammatory action by several pathologists.* M. BROUSSAIS (*Exam. des Doct. Méd.*, t. i., prop. 168) said that he had never seen tubercles in the lungs without antecedent inflammation; and Dr. ALISON, in some very able papers published between 1820 and 1830, supported a nearly similar doctrine. This enlightened physician concludes "that scrofulous tubercles may be, and often are deposited in consequence of inflammatory action; and therefore, that as, on the one hand, scrofulous diseases may be, in many cases, prevented by applying the *tonic regimen* to persons of feeble constitution, but not yet affected with actual disease; so, on the other, they may also be frequently prevented by the early and prudent use of the *antiphlogistic remedies* in those in whom the slight inflammatory complaints so often preceding them have already appeared."

106. *In opposition to the inflammatory doctrine of tubercles*, M. BAYLE, who has directed much attention to this formation in connexion with pulmonary consumption, has expressed himself very decidedly. He contends that tubercles are never an effect of inflammatory action, not even in its chronic form; and M. LAENNEC observes, that extensive observation proves that the development of tubercles results from a general disposition of the frame, that it takes place without previous inflammation, and that when inflammatory action coexists with tubercles, it is generally posterior to them in date. Moreover, the simultaneous occurrence of tubercles in nearly all the organs in the body is opposed to the doctrine of their origin in inflammation. According to M. LOUIS, inflammatory action, in some cases, influences the production of tubercles, and in other cases it seems to take no part in their formation. He farther remarks, that inflammation and tubercles occasionally coexists without being necessarily dependent on each other; and that tubercles may be developed in the lungs independently of inflammatory action of any grade, whether in the parenchyma of the organ or in the mucous membrane of the bronchi. A similar opinion has been published by MM. LEVEILLE and ROSTAN. In addition to the argument derived from the *post-mortem* appearances, I may state, that in no class of the human species are tubercles more frequently met with than in negroes and other dark varieties of the species, particularly when they are removed to a colder climate than that of which they are indigenous; and yet inflammatory diseases are seldom

observed among them. Whoever has had occasion to observe the character of morbid actions in these races, must have remarked their immunity from inflammation, and their general liability to diseases of a very opposite character, particularly to those attended with diminished vital energy, and to tubercular deposits.

107. MM. ANDRAL, LOMBARD, CRUVEILHIER, BECKER, and SCHROEDER VAN DER KOLE, entertain a doctrine intermediate between the foregoing—an opinion not far different from that espoused by Dr. ALISON, but leaning less to the inflammatory doctrine of the disease. They, however, admit the occasional origin of tubercles in a state of inflammatory congestion of the capillaries, preceded and accompanied by a constitutional disposition to tubercular productions. M. CRUVEILHIER, in his conclusions from the experiments, wherein he produced, artificially, milary tubercles, by injecting fluid mercury into the veins of dogs, considers that these bodies are formed in consequence of a stasis of the fluid in the capillaries, followed by a morbid secretion.

108. The opinion offered by M. GENDRIN appears accordant with extensive observation of the causes, phenomena, and results of tubercular disease in man and the lower animals, and agrees with the experience I have had of this disease, particularly at the Infirmary for Children. This able pathologist states, that tubercles, during the whole of their early stage, are entirely independent of every form of inflammation; and that it is not until they begin to soften that the tissue surrounding them begins to be inflamed, this tissue then secreting a fluid which aids in dissolving the dense matter composing them.

109. It may be inferred, from an intimate view of the tubercular formation, that it consists of an exudation of a matter essentially different from that which is produced by inflammatory action; and that it proceeds from a modified state of the exhalent process constantly existing in living structures, owing to a weakened state of the vital endowment of the capillaries in the seat of the disease. The coagulating lymph produced by inflammation affecting the healthy constitution is susceptible of organization; the concrete matter forming the tubercular secretion is entirely insusceptible of this process, the changes which it undergoes being chiefly the result of decomposition, and of the admixture with it of the fluid exuded by the vessels of the tissue immediately surrounding it. Accompanying inflammation, of whatever grade, attacking the sound or untainted constitution, there is always a disposition to organization of its products; but in tubercular disease an opposite tendency obtains—the capillaries exude a fluid, undergoing changes in which this vital process has no share, and inducing irritation and disorganization in the parts in contact with it. In the former state of disease, the vital endowment of the capillaries is exalted, and an emanation of it serves to organize the inflammatory products; in the latter this endowment is diminished, and insufficient to prevent either decomposition of the matters secreted by it, or disorganization from the slightest causes of irritation.

110. As to the opinion which refers tubercles to irritation in the organ in which they are seat-

ed, little need be said, especially as the abettors of this doctrine have failed to define the meaning they attach to the word irritation, and even leave it uncertain whether they apply the term to the nerves, or the extreme vessels of the part, or to both. Even those who confine the term to the extreme vessels, leave us to doubt whether the terminations of the arteries, or the radicles of the veins or of the lymphatics, are its seat, and to puzzle ourselves with conjectures as to in what particulars irritation of a capillary vessel differs from inflammation, or whether it differs at all or not. Taking it, however, for granted that those who espouse the doctrine of irritation, mean by the term an excited state of the capillaries, giving rise to augmentation of the organic action, but falling short of acute inflammation, it may be remarked, that neither the symptoms by which this state is recognised during life, nor the effects it induces in the tissues, are altogether similar to those produced by tubercles. It is true that tubercles, when once they are formed, occasion irritation in the tissues surrounding them; but this is an effect, and certainly not a uniform cause, of their formation. It is possible, also, that irritation, in any of the acceptations of the word, may sometimes occasion the development of tubercles in an organ; but this result will never take place unless with the concurrence of other causes, many of them proper to the constitution of the individual, or at least pre-existent to irritation; for wherefore should tubercles result from this vaguely supposed state, rather than from any other of the numerous changes to which it is so generally supposed to give origin, if it were not because other pre-existent and concomitant influences caused tubercles to be formed in preference to any other morbid production or lesion.

111. The arguments which have been here stated in opposition to the opinion that tubercles proceed from irritation of the capillaries in the part in which they are formed, apply with still greater force to the idea of their origin in inflammation. After every consideration I can give the subject, I would infer that tubercles originate in a modification of the nutrient and exhalant functions constantly going forward in the organic structures, owing to defective vitality of the capillaries; and that when irritation, or inflammation, or congestion occur, they are either accidental and concurrent causes, or effects resulting from the accumulation or decomposition of the morbid exhalation in the particular form constituting tubercular productions. But this local morbid condition is only a part of a more general constitutional vice, manifested not only by the organic nervous energy, but also by the digestive, assimilative, and circulating functions, and even by the state of the blood.

112. vi. OF THE IDENTITY OF SCROFULA AND TUBERCLES.—This topic would not have required discussion, if several authors of repute had not disputed the identity of those morbid conditions, more especially SCHARLAN, SCHÖNLEIN, DR. EVANS, DR. CHAPMAN, and MR. PHILLIPS. DR. GLOVER has ably reviewed the arguments which these writers have urged in support of the differences between them. But the operation of similar causes, hereditary, parental, and exciting; the appearance of both forms in the

same family, and even in the same individual; the same diathesis, constitution, and states of the blood and secretions, and a similar grade of vital endowment, of vital cohesion, and of vital resistance, characterizing both diseased manifestations; the same tendency to dyscrasy, and the same indisposition to the healthy restoration of parts in both; and the same principles of treatment, and even the same agents and means, being the most successful for the cure of both forms of lesion, are circumstances which so manifestly show identity, that an opposite doctrine cannot with due reason be supported. The differences which have been urged, moreover, do not invalidate the doctrine of the identity of these states of disease; they have reference merely to difference of seat, and of epochs of life during which the one is more prevalent than the other.

113. But the great question, the solution of which ought to put an end to all discussion, is this: Is the morbid structure of external scrofula identical in its characters with that of internal scrofula, or tuberculosis? or, in other words, Is the external manifestation of scrofula by enlarged lymphatic glands the same in its minute structure as the internal manifestation of it by tubercular deposit? Preliminary to the answer which I shall give, I should state that scrofula is a term which may be, and has been, given to a diathesis — to a constitution — to a certain appearance, described above (§5, *et seq.*), and which may exist without any manifest external or internal lesion — without any special disorder, although often accompanied by some internal affection usually denominated scrofulous. Now this external affection, whatever it may be, most commonly, however, seated in the lymphatic glands, is, as respects the morbid change, the same as that found in other or in internal parts, no farther differences being observed than such as necessarily result from difference of seat. DR. GLOVER remarks (and others have stated the same, both before and after he wrote), that the only difference which he has been able to detect between tubercular matter and the degenerated substance of scrofulous glands, is in the existence of a greater number of bodies presenting the appearance of thickened and translucent or opaque cells in the latter case; but the microscopic elements are in both instances the same. The results of chemical analysis, also, point out the identity of the two kinds of formation. M. LEBERT, whose researches into the intimate nature of scrofula and tuberculosis are most minute, patient, and trustworthy, states that the tubercular deposit in scrofulous lymphatic glands is the same as in other organs (vol. i., p. 534).

114. CANSTATT remarks, that the material and physiological causes of scrofula and tubercle, their progress, &c., scarcely leave a doubt of their identity; nevertheless, respect for those who entertain a different opinion suggests an inquiry into the force of their arguments.—a. They urge the difference of form between scrofulous formations and tubercle, the former being often indeterminate, the latter more rounded or provided with an envelope. But this is chiefly owing to the structure of the tissue in which the deposit occurs. In some cases, the lymphatic glands present in their interiors cysts filled with a tubercular matter, comparable with

isolated tubercles; and I may add, that the differences, as respects the great tumefaction of scrofulous glands and of their surrounding tissues, depend chiefly upon the nature and structure of these glands, and upon their connexions, not only with the vascular system, but also with the lymphatic vessels belonging to them, and with the adjoining cellular tissue.

115. *b.* It has been asserted that, while scrofulous glands may be injected, tubercles show no vessels in their structure. But the injection of these glands does not prove the injection of the tubercular deposit in them; this deposit, whether taking place in them, or occurring elsewhere, being without vessels, excepting such as belong to the tissue in which it is found.

116. *c.* The incurability of tubercular formations in the lungs has been adduced as a proof of difference between external scrofula and tuberculosis. But tubercles, in the lungs or elsewhere, may heal as well as the forms of external scrofula, and according to similar processes. Scrofulous formations, like tubercles, may pass into calcareous masses, or thus degenerate; or they may be thrown off by ulceration, or their supuration and the deposit of a reparative tissue may be followed by cicatrization. The chief circumstances which prevent internal tuberculosis from healing so frequently as the external malady, are the causes inducing the former, the frequently continued operation of these causes, the nature of the structures affected, the constant action of the atmosphere as respects tuberculosis of the lungs, as well as the other lesions which often precede, accompany, or follow this morbid formation.

117. *d.* It has been contended that, because persons below puberty are most frequently the subjects of external scrofula, and those more advanced in life are most subject to tubercular consumption, therefore there is a difference between them; but, as I have shown above, tubercles may occur at any age, however early, and are, in fact, very common in young children, while external scrofula may also be developed at any age; and it may be added, that open external scrofula before puberty does not prevent tubercular formations in internal parts subsequently. Tubercles may exist, in an early stage, both internally and externally in the scrofulous diathesis, and while concurring causes may develop the external malady, the internal may remain latent, or be but imperfectly manifested, or may appear long subsequently, or even not at all, if the causes usually determining the development of this lesion are avoided. Of 312 scrofulous children, only 47 were found without tubercles in the lungs. LUGOL remarks, that scrofulous children have always tubercles in the lungs. This inference is too general; but I have seldom inspected the body of a child who has died of a non-tubercular disease, and who manifested the external signs of scrofula, without finding internal tubercles in one or other stage of development.

118. *e.* It is almost unnecessary to pursue the subject farther; but one argument frequently urged is, that either form of the disease may run in families without the other form being met with. This statement is, however, pushed beyond the truth. Such an occurrence is not very frequent, nor are the exemptions contended for either complete or many. PORTAL con-

sidered both scrofula and phthisis identical, yet he admitted that either may be transmitted in families in preference to the other. Dr. HOLLAND remarks, that "in the scrofulous temperament, even more than that of gout, we have a remarkable diversity in the forms of the disease and the organs it attacks." I readily agree with Dr. GLOVER in remarking that, in respect of this topic, "on the one side all is clear, pathological and decided, founded on facts of essential relation; while on the other side we have doubtful assumptions, and at best non-essential relations."

119. vii. DISEASES ATTACK THE SCROFULOUS DIATHESIS WITHOUT BEING ESSENTIALLY SCROFULOUS OR TUBERCULAR, ALTHOUGH MORE OR LESS INTIMATELY ALLIED TO EITHER.—Not only may several diseases attack the scrofulous diathesis without being essentially tubercular, but this diathesis may predispose to them, and render them more chronic and difficult of cure. Thus, while I believe in the identity of scrofula and tubercles, I consider the latter as a development or manifestation of the former, arising out of one or more of the causes above described; and farther infer that various local affections, more or less resembling or allied to scrofula, may occur, either in delicate persons, especially in cachectic children, who are not of a scrofulous taint, or in those who are actually scrofulous, without being necessarily or actually scrofulous, or attended by external or internal tuberculosis.

120. 1st. *Various affections are occasionally met with in delicate or cachectic subjects, which are not truly scrofulous in their nature, but which, when occurring in this diathesis, are influenced by it, as stated hereafter (§ 125).* It is not uncommon to observe in delicate or cachectic children, chronic inflammations, especially of the periotestum or bones, to follow slight injuries, or other affections to follow slight causes, without any essential characteristic of being scrofulous. Various chronic affections of the skin, of the mucous membranes, or of the joints, or of the eyes, may also appear in these subjects, without presenting the scrofulous elements, although they most frequently do present them when occurring in the scrofulous diathesis.

121. 2d. *Other affections still more nearly allied to scrofula may take place in this diathesis, and yet be without any very manifest tubercular formation.* Parts may become inflamed, go on to suppuration or ulceration, and present no farther scrofulous characteristic than the long duration of the disease and indisposition to cicatrization. Caries of the bones, chronic ulceration of the skin, consequent upon eruptions, eczema, lupus, &c.; ozena, various states of gastro-enteric irritation or inflammation, diseased follicular glands, prolonged leucorrhœa, chronic bronchitis, affections of the eyes and eyelids, flexures and other diseases of the spine, enlargement of the joints, softening of the structures, &c., are very common in the scrofulous diathesis, without being attended by tubercles; and, although not strictly scrofulous, are more or less allied to it when occurring in this diathesis.

122. 3d. *These affections, however, are often attended or followed by tuberculosis either of adjoining glands or of internal viscera, especially in the scrofulous diathesis; the occurrence of*

these appearing to complicate, or to develop the tubercular deposit. On the other hand, the tuberculosis may have existed previously, and been followed by either of those, which, in some instances, when allowed to proceed, or when accompanied by a discharge and by appropriate treatment, may supersede, or partially or altogether subdue, the tubercular malady.

123. The affections now mentioned, whether occurring in the scrofulous diathesis, without manifest external scrofula, or internal tuberculosis, or complicated with either external or internal scrofula, are most frequent and most obstinate in persons whose powers of life are constitutionally low or exhausted, and the vital cohesion or tone of the tissues are originally weak or otherwise impaired. They may occur, in this state of the frame, either independently of true scrofula or tuberculosis, or in an intimate association with tubercular deposits in some part or parts of the body; they may exist without tuberculosis, or they may be associated with it, although not necessarily depending upon it. They ought, therefore, not to be considered as varieties of scrofula, but should be separated from this affection; inasmuch as, although they are often met with in the scrofulous diathesis, they frequently also occur in weak constitutions or exhausted states of the frame, in which this taint, or any actual manifestation of tuberculosis does not exist.

124. viii. THE SCROFULOUS TAIN, OR TUBERCULAR CONSTITUTION, NECESSARILY PREDISPOSES TO, AND INFLUENCES THE COURSE AND TERMINATION OF, OTHER MALADIES.—HOWEVER obvious and important this assertion may appear to many, and however frequent the observing and truly scientific physician may have had occasion to remark this influence, to regard its results, and to modify his practice accordingly, still the facts which this proposition comprises have too often been either altogether unrecognised or at least partly unheeded. The states of vital power and resistance throughout the frame, the conditions of the circulating and secreted fluids, and the vital cohesion of the tissues, of scrofulous and tubercular persons, are generally such as to predispose them to several maladies, and to modify the course and terminations of most of those which may afflict them.

125. A. As respects the predisposition which this taint occasions, it may be remarked that it is the most influential when no open or external manifestation of scrofulous disease has appeared; for when such disease is developed and is proceeding, internal and constitutional maladies are less apt to occur, or supervene only after the more energetic operation of the exciting causes. The external affection, especially when attended by a discharge, has often the effect of a derivant, and sometimes becomes a safety-valve to the economy in circumstances which might otherwise be attended by risk, as when exposed to the causes of endemic, epidemic, or constitutional disease. In other circumstances, especially when the morbid taint is present, without any active or developed external disease, the constitutional powers are too languid—too feeble, to resist the invasion of causes and the production of effects, which would have been successfully resisted by more powerful energies; and the causes of disease,

especially such as are depressing and contaminating, would make more rapid, more marked, and more dangerous impressions and changes in the scrofulous constitution than in any other. Experience furnishes many proofs of the truth of this position. Local injuries, such as bruises, contusions, concussions, the impression of cold, infectious and epidemic agents and influences, contagious and contaminating miasms and secretions, &c., are less successfully resisted by scrofulous persons than by others; and when the effect is produced by either of these, or by other causes, it is generally either more marked or more prolonged, and remedied with greater difficulty. The full development of the predisposing and exciting causes of diseases which I have attempted under a different head renders it unnecessary to remark farther on this topic, at this place, than to recall attention to its importance. (*See art. DISEASE, § 18, et seq.*)

126. B. *The Course and Termination of many Special States of Disease are very remarkably modified and aggravated by the scrofulous taint.*—(a) That this is more especially the case in respect of inflammations is generally admitted; but there is every reason to believe that the evil is not confined to this class of diseases. As regards inflammations, it may be remarked, that not only are they rendered more chronic in the scrofulous diathesis, although the acuteness, the severity, or the activity of these maladies is seldom so great as in the vigorous and healthy constitution, but their consequences are more dangerous, both as respects the changes produced in the structures affected, and as regards the state of the products of inflammation. In the strumous diathesis, softening, infiltration, tubercular deposition and disorganization of the inflamed structures readily take place; and restoration to the healthy condition is either very slowly or imperfectly accomplished. The fluids effused are much less prone to assume a state of partial or complete organization than in the healthy constitution, but they are more disposed to undergo changes of a more injurious nature—to assume a dirty curdy or cheese-like appearance, or a tubercular character, or to become the nidus of farther changes. It would appear as if the products of inflammation in the strumous diathesis proceed from a lower grade of vital action than in healthy constitutions; and that, while these products in the latter cases are more prone to organization, owing to a certain degree of derived vital endowment, those resulting from scrofulous inflammatory action are much less prone to this change, owing to this endowment being so much less as to be altogether insufficient for this end. The inflammatory products in scrofulous persons are thus not only different from those in healthy constitutions, even at the moment of their formation, but they become still more different after their exudation, owing to the partial absorption or exhalation of their more watery constituents, to the aggregation of their albuminous, mineral, and other elements, and to the consecutive irritation they produce in the surrounding or containing tissues.

127. (b) In all *fevers* also, especially such as are malignant or infectious, softening of mucous and cellular parts, ulceration of the intestinal mucous surface and follicular glands,

effusion from internal surface, and disorganization from loss of the vital cohesion of the structure, especially in parts which are pressed upon, or are irritated by external agents, more readily and more remarkably supervene in the scrofulous than in the healthy constitution. In all acute and chronic inflammations or congestions of the *brain*, *lungs*, and their *membranes*, reparation is delayed, more difficult, or is imperfect; and either effusion or tubercular depositions, with their various unfavourable concomitants and consequences, are much more apt to supervene in the scrofulous than the healthy constitution.

128. (c) The influence of scrofula is less manifest in aggravating the course of other diseases than in originating many, both of a functional and of a structural kind. All those maladies which present a tubercular character, and several of those which consist of adventitious formations, or chiefly of alteration or vitiation of the nutrition of a part, may not only, in a great measure, proceed from this diathesis, as regards some cases, but also be aggravated or even altogether transformed as respects other instances. But it is unnecessary to pursue this topic farther at this place, as it, as well as several allied topics, are more fully discussed in the articles *DEBILITY*, *DISEASE* (§ 87, *et seq.*), *INFLAMMATION*, and in other parts of this work.

129. ix. THE ASSOCIATED ALTERATIONS AND COMPLICATIONS OF SCROFULA AND TUBERCLES.—From what has been stated above, almost every tissue or organ of the body may be the seat of tuberculosis; but there is a very wide difference in the frequency of the occurrence of this lesion in different organs or parts (§ 135). I have stated, with respect to the *pathogenesis* of scrofulosis or tuberculosis, that there are modifications of organic nervous power, of capillary vascular action, and even of the blood itself, which are necessary preludes to the alteration in the textures especially affected; the local change being chiefly characterized by congestion of the capillaries and the exudation or deposit from the blood, constituting the tubercular matter (§ 109). External scrofula most unequivocally presents itself in the form of enlarged or diseased lymphatic glands; and as respects them, it has been asked by an able writer, Mr. PHILLIPS, "Is this state of the gland determined by the circulation within it of blood which has undergone change, or is it independent of the blood? Does the blood fit the organ to receive the deposit, or does the organ fit itself? This is an important question, but of very difficult solution. Important, too, with reference to treatment; because, if the action set up were purely local, means might be taken to change it and render it unfit for the deposit. If the action depend only upon a general contamination of the blood, how comes it that all the lymphatic glands are not equally affected? It is notorious that they are not."

130. But the alteration of the blood here insisted on is only one part of the morbid condition, and, as respects the succession of changes producing this condition, a more or less advanced part. These changes have already been stated (§ 101, 109), and it has been shown that the constitutional changes—the changes in the organic nervous power, in the capillary circulation, and in the blood itself consecutively upon

the state of assimilative function, are such as tend to predispose the lymphatic glands, as well as various other textures, to experience these changes in a more manifest degree, especially upon the operation of various causes, whether constitutional or local, whether depressant or irritant, and to favour the supervention of farther changes in the capillary circulation of these parts, and ultimately to produce the exudation in them of the materials constituting the tubercular deposit.

131. The cause or source of the swelling and hardness presented at an early stage by external scrofulous glands has been a topic of discussion. This has been ascribed to increased vascularity in the first instance, and to the morbid exudation in the second. This is probably the case; but it is not so manifest that the vascularity is owing to increased action; it is more probably the result of interrupted circulation—of congestion, not merely of the blood in the capillaries of the gland, but also of lymph in the proper lymphatic vessels of the organ, aided more or less by an exudation of molecules or tubercular materials, or elements from the congested capillaries, which materials are incapable of organization, and which, by their aggregation, become more and more manifest, as shown above (§ 109). As these accumulate, they often change the capillary congestion, which partly occasions them, to inflammatory irritation, followed by the usual products of inflammatory action; and thus a state of simple congestion of the glands, induced in a constitution such as I have described, is converted, by the material exuded from the congested capillaries, and by the irritation this material occasions, into a state of inflammatory congestion, with all the consequences of this state in its more chronic forms. It should not, however, be admitted that the swelling existing in these cases is altogether owing to the changes within the gland itself; for much of it arises from congestion, increased vascularity, and serous effusion in the cellular tissue surrounding the affected gland. The greater tendency, also, of the external glands to become enlarged and ultimately even inflamed, in connexion with tubercular deposits in them, may be ascribed to the greater exposure of these glands to physical influences and agents, and to local or external irritants, affecting not merely their state of vital power and action, but modifying also the condition of the blood circulating through them.

132. A careful examination of a scrofulous cervical gland by Mr. DALRYMPLE is thus described in Mr. PHILLIPS's work: "This enlarged gland appears to consist of a general parenchyma in a state of chronic inflammation, surrounding irregular masses of yellowish white matter, more immediately the subject of examination. In direct proximity to the edges of this white material, the blood-vessels are seen to be more enlarged and congested than elsewhere, and in some parts the capillaries are occluded with coagulated blood. The parenchyma, which at first sight appears healthy, is, on examination with high power, found to be infiltrated with exudation corpuscles, resembling lymph globules. The natural texture of the gland consists of its proper corpuscles, filamentous tissue, blood-vessels, lymphatics, and nerves. In this morbid specimen, every where is the filamentous tis-

sue infiltrated, and its fibres separated by innumerable exudation corpuscles, and the proper corpuscles of the gland are similarly surrounded and imbedded. As the parenchyma is nearer to the whitish matter, so proportionally do the proper corpuscles of the gland become more indistinct, the filamentous tissue more obscure, the blood-vessels irregularly dilated and filled with red globules, and they at last disappear insensibly. The exudation corpuscles are more numerous, but irregular in size and shape, and interspersed with minutely granular matter (p. 45).

133. A. The *modifications and associations of scrofula and tuberculosis* are to be ascribed chiefly to the pre-existence or association of various grades of capillary congestion, sometimes passing into chronic inflammatory irritation, in the seats of the tubercular exudation. But it may be asked whether or not this exudation ever occurs without these antecedent states of congestion or of inflammatory irritation. There is no sufficient reason to infer that this deposit may not take place without either of these alterations of local vascular action; for milary tubercles and gray granulations are often found in tissues, the capillaries of which present no material alteration. It may, therefore, be inferred that tuberculosis may appear, 1st. Independently of locally increased vascular or capillary action; 2d. Consequently upon capillary congestion; 3d. In connexion with inflammatory irritation, or inflammatory congestion, of the part; and, 4th. Where the inflammatory diathesis is associated with the scrofulous, or where tuberculosis is associated with inflammation of a subacute or chronic kind. While, however, either of these states of local vascular action may precede or accompany the morbid deposit or exudation constituting tubercles, it is not improbable that this deposit as often becomes the cause, as shown above (§ 110, 111), of the vascular disorder, inducing such disorder where it has not previously existed, and increasing or developing it where it had already commenced.

134. B. The *complications of tuberculosis* are so diversified that a particular notice of them cannot be given at this place. It must be obvious that the state of constitution described above to constitute the scrofulous diathesis will favour the occurrence of various disorders, both without or independently of any tubercular deposit, and in more or less intimate association with it. It has been shown (§ 123, *et seq.*) that the scrofulous taint favours the occurrence of several diseases not actually scrofulous or tubercular, and that it modifies the course and termination of others; and various affections have been enumerated above (§ 119–121) as being met with in delicate constitutions, which are not scrofulous, in the scrofulous diathesis, without evidence of tubercular deposits, and in this diathesis complicated with these deposits in one or more organs. A knowledge of such occurrences, either as now stated, or as particularly noticed above, is sufficient to suggest the chief indications of treatment which these associations will require in respect of their individual forms.

125. X. THE COMPARATIVE MANIFESTATIONS OF TUBERCULOSIS—A. AS TO THE COMPARATIVE FREQUENCY OF TUBERCULAR FORMATIONS IN THE

DIFFERENT ORGANS OF THE ADULT BODY, much interesting information has been adduced by MM. LOUIS, LOMBARD, and ANDRAL.—(a) The lungs hold the first place, in respect of frequent liability to the disease; next, the small intestines. M. LOUIS found (leaving the lungs out of the calculation) in 358 adult subjects, tubercles in the small intestines in a *third* of them; in the great intestines, in a *ninth*; in the mesenteric glands, in a *fourth*; in the cervical glands, in a *tenth*; in the lumbar glands, in a *twelfth*; in the prostate, in a *thirteenth*; in the spleen, in a *fourteenth*; in the ovaries, in a *twentieth*; in the kidneys, in a *fortieth*; in the uterine, in a *one case* of them only; in the cerebrum, in a *one case*; in the cerebellum, in a *one case*; and in the ureter, only in a *one case*. There was no account taken, in those cases, of the occurrence of this production in the testicles or in the bones, which is not uncommon. Out of all of them, M. LOUIS found only one case in which tubercles were found in different other organs without existing in the lungs.

136. In one hundred adult subjects, Dr. LOMBARD found, not counting the lungs, tubercles in the intestines in 2 cases; in the mesenteric glands in 19; in the bronchial glands in 9; in the cervical glands in 7; in the spleen in 6; in the lumbar glands in 4; in the sub-peritoneal cellular tissue in 4; in the maxillary glands in 3; in the glands of the anterior mediastinum in 3; in the sub-arachnoid cellular tissue in 2; in the spinal chord in 2; in the false membranes of the pleura in 2; in those of the peritoneum in 2; in the intercostal muscles in 2; in the ovaries in two; and in the parietes of the gall-bladder, in the liver, cavity of the pleura, posterior mediastinum, vertebræ, ribs, omentum, uterus, prostate, sub-mucous tissue of the bladder, cerebrum and cerebellum, medulla oblongata, kidneys, and vesiculæ seminales, *one each*.

137. M. ANDRAL states, that his observations as to the relative frequency of tubercles in the different organs of the body observe nearly the same order as that indicated above, excepting that he has found in more cases than M. LOUIS, tubercles in other organs without detecting them in the lungs. He has also discovered them in the false membranes of the pleura and peritoneum in a greater proportion of cases than M. LOMBARD. M. ANDRAL has found them in the intervertebral cartilages in one case; and he adds very interesting information respecting the relative frequency of tubercles in the different organs of children.

138. (b) *Tubercles in children* more frequently affect a number of organs at the same time than in adults. They occur more commonly in this class of subjects, in other organs, without existing in the lungs. It will, moreover, be seen, from the following results furnished by M. LOMBARD, that the parts most commonly affected in adults are not altogether those which are so in children. In a hundred young subjects, he found tubercles in the bronchial glands in 87 cases; in the lungs in 73 cases (in 30 of which but one lung was affected, viz., the left in 13, and the right in 17 cases); in the mesenteric glands in 31 cases; in the spleen in 25; in the kidneys in 11; in the intestines in 9; in the nervous centres in 9; in the cervical glands in 7; in the membranes of the brain in 6; in the pancreas in 5; in the gastro-hepatic glands in

5; in the sub-peritoneal cellular tissue in 5; in the spleen in 4; in the inguinal glands in 3; in the cellular tissue under the pleura in 2; in the lumbar glands, in the sub-mucous tissue of the bladder, in the omentum, in the parietes of the gall-bladder, and in the false membranes of the pleura, *one case each*. It may be remarked that, in these hundred cases, tubercles were not found in the liver in a single case; and in all the cases of adults the liver contained tubercles in one case only.

139. M. PAPAVOINE found, in 50 children in which the seat of tubercles was ascertained, 49 in which they existed in the bronchial glands; 38 in the lungs; 26 in the cervical glands; 25 in the mesenteric glands; 20 in the spleen; 17 in the pleura; 14 in the liver; 12 in the small intestines; 9 in the large bowels; 9 in the peritoneum; 5 in the brain; 3 in the cerebellum; 3 in the cerebral membranes; 3 in the pericardium; 2 in the kidneys; 1 in the pancreas; 1 in the vertebrae; 1 in the stomach. In 10 instances tubercles were present in the bronchial glands without having been found in the lungs. The relative frequency of tubercles in the abdominal organs is very different in M. PAPAVOINE's table from that furnished by M. LOMBARD. The above show that they are more frequent in the bronchial glands of children than in the lungs; while in adults the proportion is much greater in the latter than in the former. Besides, in this class of subjects, they are seldom met with in these glands without being observed in the lungs; but they are often found in adults, in the lungs, without there being any in the glands.

140. *B. AS TO THE RELATIVE FREQUENCY OF TUBERCLES AT THE DIFFERENT PERIODS OF LIFE*, without reference to the organs in which they are seated, the following inferences may be adduced: 1st. Tubercles are very rarely developed in the fœtus; but several instances have occurred to me, particularly in the lungs of those whose mothers were suffering from phthisis during gestation.

141. 2d. During the first months after birth, tubercles are likewise rare. In the lungs of an infant (attended by Mr. Nicholson of Davies's Street and myself) born of a mother far advanced in consumption, affected with cough from the moment of birth, and that died instantly from profuse hæmorrhage from the lungs under three months, the lungs were so studded with tubercles, many of them large and softened, as not to collapse upon opening the thorax. Tubercles existed nowhere else. This state of disease in so young a subject was rare, and the nature of the result still rarer.

142. 3d. From nine months to five or six years, tubercles are very frequent. According to M. LOMBARD, tubercles are found in only one eighth of the children who die between the ages of one and two; in two sevenths of those between two and three; in four sevenths of those who die between three and four years of age; and in three fourths of those who die between the ages of four and five years. From my experience at the Infirmary for Children, I am of opinion that M. LOMBARD calculates the proportions as too high in respect of children between the ages of three and five, and too low in respect of those below two years. However, the results may vary somewhat between Lon-

don and Paris. There can be no doubt of the fact mentioned by this writer, that at the age of four or five years a greater number of organs are simultaneously affected with tubercles than at either an earlier or later period of life. I believe that these tubercles begin to form about the period of dentition and weaning, the change which is then made in the diet of infants being the chief cause of their formation; and that the fatal effect most commonly does not occur until about the fourth or fifth year.

143. 4th. From the sixth to the sixteenth year tubercles are much less frequently met with than from the third to the sixth, but they occur more frequently than under the age of two years. The results which I have stated in the preceding paragraphs differ much from those furnished by M. LOMBARD; but they are in many respects confirmed by the researches of M. PAPAVOINE made at the Hospital for sick Children at Paris. This physician found, in 408 children under fourteen years of age affected with tubercles, 73, or 1-5-1-2, under two years; 64, or 1-6, from two to three years of age; 46, or 1-9, from three to four; 35, or 1-12, from four to five; 32, or 1-13, from five to six; 29, or 1-14, from six to seven; 24, or 1-16, from seven to eight; 16, or 1-25, from eight to nine; 18, or 1-23, from nine to ten; 12, or 1-31, from ten to eleven; 24, or 1-16, from eleven to twelve; 10, or 1-41, from twelve to thirteen; 11, or 1-40, from thirteen to fourteen; and 14 whose ages were not ascertained.

144. 5th. After puberty tubercles again become more frequent, but only as regards the lungs, the intestines, and some parts of the lymphatic system, especially the lungs. Does this increased frequency arise from the new source of exhaustion which comes into action in the development of the genital organs? I think that it does. According to M. ANDRAL, males are particularly subject to tubercles between the ages of twenty-one and twenty-eight; while females are more subject to them before the age of twenty. After these periods, tubercles are much less frequently met with until from about the 38th to the 45th year in females, and from about the 40th to the 55th year in males, when a slight increase is again remarked, particularly in females.

145. *C. AS TO THE COMPARATIVE LIABILITY OF THE SEXES*, it has been generally admitted that the female is more frequently the subject of tubercles than the male sex, and this certainly holds in respect of children. But according to the data furnished by M. LOMBARD, the difference of liability of adults is extremely small. He states, that in 52,857 persons who died of tubercles in the lungs, 26,124 were males, and 26,733 females. M. LOUIS, however, found the proportion of adult males to females affected to be 70 to 92. M. PAPAVOINE considers the difference to be still greater between the two sexes in children. According to the returns of the Registrar General, the proportion of deaths by tubercular consumption is about 24 males to 28 females.

146. *D. WITH REFERENCE TO THE OCCURRENCE OF TUBERCLES IN THE LOWER ANIMALS*, M. ANDRAL observes, that "several animals have, in common with man, the tendency to tuberculous affections. Among the mammalia, animals using the most different kinds of food are equally sub-

ject to these affections—the carnivorous as well as the herbivorous. Among the carnivorous, however, there is one species in which, though we frequently examine their bodies, genuine tubercles have never been discovered: I mean the canine species. Is this because the dog lives in freedom in a climate that agrees with him, and where he can enjoy exercise in proportion to his strength? And is it because the lion happens to be in opposite circumstances, that he dies in this climate affected with tubercles? Most of the animals in which we have proved the existence of this affection are either transported from a hot to a cold climate, where they are deprived of liberty and exercise (as is the case with monkeys and parrots), or confined in damp places, without sun, and almost without air (cows, pigs, house-rabbits), or exposed either to continual alternations of heat and cold, or to constrained and violent exercise, as the horse.* The want of due ventilation, or a too frequently respired air, a too hot or close, or a too cold and humid atmosphere, and the close confinement so opposite to the habits of these animals, are not without their influences.

147. XI. ARE SCROFULA AND TUBERCULOSIS MORE PREVALENT NOW THAN FORMERLY? This question hardly can be answered in the present state of knowledge, as the data on which rational speculation respecting it either are altogether wanting, or are of so loose a kind as to prevent the possibility of arriving at a sound conclusion on the subject. Mr. PHILLIPS has, indeed, entertained the topic, but with reference chiefly to external scrofula, or the "King's evil," as so denominated in former times. The principal data he has adduced are the loose reports of the bills of mortality of former years, and the numbers said to have received the royal touch during the reign of the second Charles. It is obvious that no conclusion can be drawn from these respecting the comparative prevalence of the several forms of tuberculosis in former and recent times. A careful consideration of the relative influence of the principal causes of scrofula in past ages and at the present day, may suggest vague ideas on the subject; but as certain of these causes were, perhaps, more influential formerly than now, while others were less so, and while some have even recently come into operation, others have nearly or altogether disappeared, the question must be viewed as not admitting of solution, however important the considerations which it involves.*

* It is well known that the active causes of disease and death are increasing in this country, and that the average duration of life is not as great now as it was 40 or 50 years ago. It will be found, on examining bills of mortality, that deaths by scrofula and tuberculosis have equally increased. For example, the deaths in Boston, in 1830, were 1 in 48; in 1845, 1 in 39. The deaths under 5 years of age, in Boston, in 1830, were 5.96 per cent.; in 1840, 7.32 per cent.; and in 1845, 9 per cent.—nearly doubling in less than 20 years; and in all the years under 40, there also appears an increased mortality. The same holds true, so far as we have data, throughout New England and New York. Thus the average age of all that died in Boston, in 1810 to 1820, was 27.85 years; while in 1840 to 1845 it was 21.43 years only, showing a difference of 6.42 years. In New York, in 1810 to 1820, it was 26.15 years; and in 1840 to 1845, it was 19.69, a difference of 6.46 years. In Philadelphia, in 1810 to 1820, it was 26.25; and in 1840 to 1845, it was 22.01, a difference of 4.24 years. Since then the duration of life has declined in each of these cities. It is found that the average age of our clergymen is seven years less than it was 30 years ago, and that of physicians is 9 years less; and the same decline has occurred among all ranks and professions. So that, although medical skill has in-

148. IV. THE PREVENTION OF SCROFULA AND TUBERCULOSIS.—It is obvious that the *prevention of a constitutional taint*, which is not limited to the individual thus tainted, but which is very commonly propagated to his offspring, in some one or other of its forms or contingent effects, is much more important than even the cure of these effects, when they come under the eye of the physician; and it is equally obvious that the prevention consists in the avoidance of the causes producing this taint—these causes being fully exposed above (§ 13, *et seq.*), with the implied object of enabling the medical adviser, or whoever is concerned in the matter, carefully to avoid them—this avoidance having reference to the parent or parents, and to the offspring for successive generations. By no class of diseases are the misconduct, the imprudence, and the want of judgment of the parents more severely punished than by this—by none so distressingly, hopelessly, extensively, and successively, until the tainted race is almost or altogether extinguished. Instances illustrative of the misery—of the numerous miseries—resulting from the thoughtless, the ignorant, the worse than culpable intermarriages of scrofulous persons, or even by the marriage of a healthy person with one who is thus tainted, crowd upon my recollection, and are too common—too well known to every one who may read this—to require enumeration. The subject is sufficiently illustrated by the calm consideration of every thinking mind.

149. Several of the causes which I have discussed above require only to be known to be guarded against, and certain of them may readily be avoided by careful persons. Others cannot be avoided by those most concerned, or who are about to become their victims; but they may be altogether removed by those who have the power of inflicting them. Richly-endowed public institutions or schools may be so managed, and have been so managed, as to become hot-beds for the generation of scrofulous or tuberculous diseases. The same remark often applies to private as well as public schools, and not merely as respects food and clothing, but also as regards ventilation, exercise, light, sunshine, and purity of air. The constitutions of the industrious poor are sacrificed on the altar of gain, and governments lend their aid to the immolation, that they may receive the unrighteous support of the priests of mammon in perpetuating their power, their patronage, and the aggrandizement of their satellites. The physical and moral ameliorations, which salutary measures would impart to those most in want of them, cannot be afforded out of the luxuries and patronage which aristocratic governments bestow on their supporters and themselves. The inevitable tendencies of extreme taxation and of an immense national debt are to reduce the middle classes to the lowest, to render the poor still poorer, more wretched and more debased, to augment the wealth and the influence of capitalists and contractors, to render these last more dishonest and over-reaching; and, as the general result, to multiply beyond calculation the chief sources from which scrofulous and tuber-

increased, and science advanced, yet the active causes of disease have increased faster than the appliances for their prevention and cure, as shown by Mr. SHATTUCK, in his "Sanitary Report," p. 104, 105.]

cular maladies, the physical curses of society, derive their origins. Dishonesty, moreover, in professions, trades, and the several relations of life—the necessary consequence of the foregoing—is daily increasing, and leaving its victims physically and mentally reduced, thereby favouring still more the invasion of the most hopeless forms of the maladies under consideration. These are results which are manifest to the common-sense thinker, however they may be controverted by political economists, and by political and statistical haranguers, who will prove or disprove whatever may suit their arguments, their purposes, or their motives, and even bring an array of figures and numbers to their support, without caring for the accuracy of the amounts which they thus imposingly marshal.

150. *The hygienic treatment of scrofula* should, however, not be limited to the careful avoidance of the causes above described, whenever this object can be attained; but be extended to the use of such rational means as may prevent the full development of the scrofulous taint, and of its consequences, in those who may evince it in any grade, in childhood or infancy, and more particularly in the children of scrofulous parents. If this latter indication be carefully pursued, and if judicious means be employed, much may be accomplished, especially if the tainted subject be early submitted to these measures. As respects the *infants* of scrofulous parents, hygienic

[* It is abundantly evident that the great objects of investigation connected with scrofula and tuberculosis are the *causes* and *means of prevention*. These can only be ascertained by an extensive series of systematic, uniform, and exact observations of the external circumstances, atmospheric, local, and personal, occurring in each case. The *American Medical Association* could not engage in a more useful labor—one promising more beneficial results to humanity—than in an energetic and united effort to obtain such observations in regard to as many cases of these affections as possible. These, tabulated in due form, would lead, by an easy induction, to general facts and principles, which could be readily applied to the prevention of these wide-spread and fatal maladies. To show the influence of the seasons upon tuberculosis we quote the following table from Mr. SHATTUCK's "Report of the Sanitary Commission of Massachusetts."

Months.	Massachusetts, except Boston. 1842-1848. Both sexes.		Boston. 1848-49. Both sexes.		New York. 1848-49. Both sexes.	
	4 Years. 1842-48.	Male.	Female.	1 Year. 1848-49.	6 Years. 1842-48.	Both sexes.
January.....	1,113	273	446	68	888	
February.....	1,134	296	439	43	855	
March.....	1,248	317	484	59	923	
April.....	1,242	306	484	75	917	
May.....	1,195	273	463	50	799	
June.....	1,084	270	410	49	711	
July.....	1,159	302	434	62	698	
August.....	1,197	315	474	56	718	
September.....	1,270	315	498	45	745	
October.....	1,198	286	470	34	766	
November.....	1,060	277	417	50	690	
December.....	1,127	272	439	65	751	
Total.....	14,027	3,502	5,458	654	9,471	
Winter.....	3,495	886	1,369	168	2,676	
Spring.....	3,521	849	1,357	174	2,427	
Summer.....	3,626	932	1,406	163	2,161	
Autumn.....	3,385	835	1,326	149	2,207	

Thus it appears that the largest number of deaths occur in September, though they are nearly the same in March and April; while the smallest number occur in November and the autumn quarter, a law which seems to prevail in Great Britain as well as this country. Such tables, however, throw no light upon the causes of the disease; nor, as the disease is indefinite in its duration, do they indicate the seasons when the seeds of the malady are most extensively planted in the constitution, which are doubtless the autumn and winter. That *age* and *sex* have a greater influence in modifying the operation of its causes, is demonstrated by the following table, for which we are also indebted to Mr. SHATTUCK.

enic treatment should be adopted as early as possible. If the taint exist on the mother's side,

Age.	Massachusetts. 4 Years. 1842-1848. Both sexes.		New York. 6 Years. 1848-1849. Both sexes.		New York. 1 Year. 1848-1849. Both sexes.		London. 4 Years. 1842-1846. Both sexes.	
	Male.	Fem.	Male.	Fem.	Male.	Fem.	Male.	Fem.
Under 1.....	386	172	151	93	116	144	583	583
1 to 2.....	255	97	79	123	119	87	491	525
2 to 3.....	208	65	79	157	136	84	344	378
3 to 4.....	859	334	309	390	348	287	1,428	1,486
4 to 5.....	192	62	107	101	56	74	350	439
5 to 10.....	1,005	182	142	52	82	45	110	102
10 to 15.....	1,005	182	142	52	82	45	110	102
15 to 20.....	3,368	708	1,409	921	1,165	631	1,010	1,234
20 to 30.....	4,242	567	945	1,065	949	417	3,199	3,167
30 to 40.....	1,649	431	610	812	498	339	1,815	2,099
40 to 50.....	1,241	378	453	434	254	289	1,180	2,004
50 to 60.....	1,239	364	423	260	163	257	1,644	1,027
60 to 70.....	1,362	310	365	67	79	220	723	471
70 to 80.....	330	79	128	37	27	66	18	11
Over 80.....	13,711	4,643	5,384	3,911	2,770	3,720	7,066	12,964
Total.....	1,355	464	533	531	391	490	925	2,041
Under 15.....	9,755	2,226	3,333	3,437	3,111	3,822	6,633	6,116
15 to 60.....	2,621	753	916	364	269	563	617	625
Over 60.....							886	506

From this table we learn that tuberculosis is most frequent from 20 to 30, and next, from 30 to 40, that, at the ages of 20 to 30, the number of females who die of consumption is nearly double that of males, being 1409 of the former to 708 of the latter, while from 30 to 40 the number of each sex is nearly similar.

The following table of Mr. SHATTUCK shows the relative population of the sexes, victims of tuberculosis, in different places and countries.

Places.	Time.	Both Sexes.	Males.	Fem.	Proportion of each.
Massachusetts.....	4 y's.	8,827	3,413	5,384	as 39 01 to 60 99
N. Y. City.....	7 "	9,606	4,938	4,668	" 51 41 " 48 59
N. Y. State.....	2 "	6,715	2,827	3,888	" 42 08 " 57 92
Philadelph.....	10 "	7,666	3,851	3,815	" 50 23 " 49 77
London.....	4 "	27,788	14,924	12,864	" 53 35 " 46 65
England.....	1 "	52,176	24,048	18,088	" 46 13 " 53 87

It thus appears that, while the disease destroys more males than females in New York and London, it destroys nearly the same of both sexes in Philadelphia, and in the country towns of Massachusetts, the proportion of the sexes is as 39:01 males to 60:96 females; in New York, as 42:08 to 57:92; and in England, except London, as 46:13 to 53:87, a striking difference appearing in all ages over 20. What are the particular causes which render the disease so much more rife relatively among females in the country than in the city, remains to be shown, as well as the different causes existing in cities to aggravate the disease in the other sex. If we turn our attention to *locality* as influencing this disease, we find, for example, that the proportion of deaths in the four western counties of Massachusetts from it does not vary much from that on the seacoast, being from 18:29, to 21:67 per cent., or as 1 in 5:43 to 1 in 4:61 of all the deaths; the lowest number in the state having occurred in Boston, from 18:30 to 18:40, 14:04 per cent., or 1 in 7:11. In New York city, from 18:11 to 18:20, the mortality from tuberculosis was 23:40 per cent., or 1 in 4:27; while throughout the state, in 1847 and '48, the mortality was 25 per cent., or 1 in 4. A superficial survey of this subject would seem to show that the prevalence of tuberculosis is, to a considerable extent, independent of those causes above mentioned, for we have seen that it sweeps off nearly as many among the scattered country population of New England as among the crowded denizens of our large cities. There would, indeed, appear to be some constitutional taint, predisposing about one fourth of our population to this fatal malady; and this, too, when surrounded by circumstances apparently the most favourable to health and longevity. Our manufactures are not so managed, as in England, as to develop scrofula or tuberculosis to any great extent; while labour is so well rewarded, that the poorest can obtain an abundance of wholesome food. What, then, are the specific causes which predispose so many of the female sex to these mal-

a wet-nurse of healthy constitution, and suitable as to the state of her milk, should be procured; and if this be impossible, ass-milk, immediately upon being drawn from the animal, or goat's milk, may be given. Recourse may otherwise be had to milk expressed through a bag containing suet, as advised by Dr. PARIS. Great care, especially as respects food and clothing, should be taken of the child at the periods of dentition and weaning. At these epochs, especially the latter, ass-milk, milk boiled with suet—cod-liver oil, or sweet oil, on the surface of the milk—small doses of liquor potassæ, or of BRANDISH'S alkaline solution, or of the iodide of iron, in the sirup of sarza, especially in older infants or children—salt-water bathing, the temperature being adapted to the strength of the child—and warm flannel clothing over the whole body, are the most beneficial hygienic means.

151. The support of animal warmth, and the animal heat derived from a young healthy nurse, are most beneficial to delicate, and more especially to scrofulous infants, and the more so the younger the child. An emanation of organic nervous power, as well as of warmth, may be furnished from this source to the delicate infant. The lower animals afford this protection to their young until growth is considerably advanced; and yet the young animal which is most helpless in infancy, and requires this the most, is the oftenest deprived of it, or is allowed to remain no longer in the bosom of its nurse than when it is suckled. During the coldness or coolness of night, and often in a chamber much below the usual temperature of the sitting apartment, the infant is often allowed to sleep in a cot altogether apart from the curtained and warmer bed of the nurse.

152. Change of air, or the migration from one locality to another, according to the circumstances of the case, the age of the patient, and the season of the year; removal from crowded towns or situations; residence near the sea-coast, in a temperate and dry air, and on a gravely or sandy soil; sea-voyaging in some cases; sleeping in large airy chambers; exercise in the open air, the enjoyment of light and sunshine during the waking hours, and limiting sleep to the hours of darkness, are generally of great service, especially in advanced childhood, and during the progress to puberty. Cold-bathing, particular sea-bathing, frictions of the surface, a generous diet, with a due proportion of animal food, and regular meals, are also most beneficial in the early periods of life. While these means are pursued, the digestive and assimilative functions should be promoted, whenever they are insufficiently performed, by stomachic and tonic aperients, as the compound decoction of aloes with the compound steel mixture, or the compound infusions of gentian and senna; and the use of unnecessary stimuli or stimulating bev-

erages, of pork and indigestible meats, of sugar and saccharine substance, should be avoided.*

153. As puberty advances, the utmost care should be exercised in all matters which may affect the sexual feelings or desires. A proper superintendence of both sexes ought to be instituted, in order to prevent the tendency to masturbation, which is greater among scrofulous constitutions, at this epoch of life, than in others; and which, if practiced at all, will certainly develop this diathesis into actual tubercular disease, especially tubercular consumption. A careful supervision should also be exercised, after puberty, in order to prevent attachments being formed between scrofulous persons, or between an individual of this diathesis and one who possesses a healthy constitution. This intention, however, will frequently fail; but where it is attempted among the well-informed classes, and the evils consequent upon the neglect of it are duly explained by members of the profession, it will receive attention, and the good results will ultimately become apparent.

154. V. THE MEDICINAL TREATMENT OF SCROFULA AND TUBERCULOSIS.—The medicinal treatment of scrofula consists, 1st. In aiding the hygienic or regimenal treatment above discussed, when the scrofulous taint is suspected or apparent, especially in early life; and, 2d. In employing such medicinal agents as are most likely to arrest the progress of the mischief when scrofula or tuberculosis is more or less manifest. In the first case, medicines are chiefly brought in aid to hygienic means; in the second, they are the principal agents, regimenal means being aids to their operation.

155. i. *In scrofulous cases devoid of any very manifest local lesion*, in connexion with the hygienic means now mentioned, various medicines possessing an alterative and tonic influence may be used. One of the earliest indications of scrofulous taint is furnished by the weak state of the digestive functions—a state evidently caused by the low condition of organic nervous power; and hence occur indigestion, flatulency, acidity of the prima via, irregular state of the bowels, torpid function of the liver, and consecutively a poor or thin state of the blood. Formerly small doses of blue pill, or of gray powder, with soda or other antacids, were given for

[* We have seen great benefit result from the use of the compound decoction of aloes in scrofulous and anemic subjects, but we should hardly be willing to recommend any of the preparations of *senna* as a stomachic, or to aid the function of assimilation. With regard to *sugar*, we agree with Dr. DUNGLISON, who states that it is one of the most important agents for modifying the functions of nutrition that we possess. Under the use of three or four ounces daily of sugar, in the form of sirup, this writer remarks that "the patient has rapidly gained weight, and the action of the system of nutrition were so much changed that the *cachexy* induced by poor living, and a residence in confined, unhealthy situations, as well as that which characterizes atrophy without any manifest cause, has been removed; a complete renovation has taken place; inveterate cutaneous diseases have disappeared, and old ulcers have filled up and cicatrized. The sugar in these cases appears to act as a *substantive* and *adjective* aliment; that is, it furnishes a richer and more abundant chyle; and, moreover, puts the digestive organs in a condition to derive a larger quantity of nutriment from the food than they would otherwise do, or it acts as a condiment." We have not observed the injurious effects of saccharine substances in those cases, as pointed out by Dr. COPLAND, although, from our limited experience of its use, we are not prepared to endorse freely the statements of Professor DUNGLISON.]

adies? We suppose it will not be disputed that they are often, at least, to be traced to a violation of some of the laws of health; as sleeping in close, ill-ventilated apartments; neglect of out-door exercise; tight lacing, and the present monstrous and absurd modes of dress; inattention to the functions of the skin and bowels; sitting in rooms heated by air-tight stoves; sleeping in feather beds, beneath thick cotton quilts; reading works of fiction, &c., &c. In short, all causes which lower the vital forces, and tend to the deterioration of the general health, must predispose, to a greater or less extent, to the development of these diseases.]

these, conjoined with stomacheic aperients and tonics; and very frequently with marked benefit, which, however, was very often counteracted by the excessive use of sugar and saccharine substances, the injurious influence of these either being not known in these cases or overlooked. This treatment, first advocated by the truly greatest name in medicine of his day—Mr. ABERNETHY—was afterward advocated by his pupil, Mr. LLOYD, and is still one of the best that can be adopted; and has been employed by myself in numerous cases with marked advantage and variously modified. Two grains of gray powder, with one or two of dry carbonate of soda, or four or five of magnesia, with rhubarb and powdered cascarrilla or cinnamon, taken once or twice daily, according to the features of the case, were generally most beneficial.

156. In cases which present increased frequency of pulse, with or without the disorder of the digestive functions, the use of the above means, modified to meet the circumstances of the case, will be advantageously assisted by small doses of either the infusion or the decoction of cinchona, with the solution of the acetate of ammonia, sometimes with the ammonia in excess, and the sweet spirits of nitre; or the infusion of cinchona may be given with moderate doses of the hydrochloric acid and hydrochloric ether. In cases where aperients are required, and when a pill may be taken, PLUMMER's pill may be given at night with soap; and the citrate of magnesia, or the phosphate of soda, in some pleasant vehicle in the morning.

157. On the other hand, when, with disorder of the digestive organs in scrofulous subjects, there is more or less languor of the circulation and of the frame generally, Dr. GRIFFITH's myrrh mixture—one of the most valuable medicines in existence—with the compound decoction of aloes, when the bowels require aid, sometimes with the addition of the solution, or of the carbonate of potash and extract of conium, &c., will then be found most serviceable.

158. Since the introduction of *iodine* into practice, there has been no other substance so generally employed as it has been, in some one or other of its preparations, and especially in the form of iodide of potassium. It has superseded the use of mercury even in the combinations mentioned above; and certainly, when prescribed in small doses, as I have usually done since 1821, and in conjunction with the solution, or the carbonate of potash, with the mixture just mentioned, or with a tonic infusion, or with some preparation of sarza, it is a valuable remedy; but it is one that may prove injurious if it be given in too large or frequent doses, or insufficiently diluted, or if its effects are not carefully watched in all cases.

159. Where scrofula is suspected or manifest by its taint, rather than by developed disease, other means may be employed, either alone or in aid of those already noticed; and one of the best, both as a nutrient and as an alterative, is the *cod-liver oil*. When it is prescribed in full doses for the age of the patient, an alterative mercurial pill or powder may be taken occasionally at night (§ 155), and an aperient in the morning, in order to promote the functions of the liver and to prevent biliary accumulations; and in cases where the debility is marked, and the surface is pallid and the structures flabby,

the use of this oil should be aided by the preparations of iron, or it may be taken on the surface of water containing a few drops of the hydrochloric tincture of iron.

160. In cases of scrofulous taint conjoined with much debility, as well as in those presenting manifest external or internal tuberculosis, various modifications and combinations of the above means may be brought in aid of hygienic measures. The alteratives may consist of a combination of mercury and of iodine, or of iodine and iron, with preparations of sarza, or with tonic infusions, according to the features of the case; and while these are being employed at suitable periods of the day, the cod-liver oil, or vegetable tonics, or bitters may also be taken. But in these the several means already advised, both for the prevention of the farther development of the malady and as regimenal treatment, should not be neglected, according as the peculiarities of the case may suggest.

161. In some cases of external scrofula, when there was a languid circulation, more benefit has appeared to accrue from the internal use of the muriatic or nitric acid, or the nitro-muriatic acids, prescribed in an infusion of cinchona, than from any of the preparations of iodine; while in others a course of two or three weeks of the former has been alternated with a similar course of the latter with obvious benefit. In some instances, also, the muriated tincture of iron, conjoined with an increased proportion of the acid, or with the hydrochloric ether, has been prescribed with the infusion or tincture of calumba or quassia, with even greater advantage than either of the preceding.

162. A combination of small doses of the bichloride of mercury, with the compound or simple tincture, or the decoction of cinchona, or with the preparations of sarsaparilla, has been long recommended both for the scrofulous taint and the more declared forms of tuberculosis; and I have frequently had recourse to it in one or other of these forms. In non-febrile cases, or where a tonic is required, this combination is often eminently beneficial; and a course of it is generally very advantageously followed, or alternated, by one of either of the preparations of iodine, as already advised (§ 158, 160, 161).

163. ii. *The medicinal treatment of the more developed states of tuberculosis* is not materially different from that already recommended; but there is generally required a more appropriate application of the means already mentioned, as well as of others about to be noticed, to these states—to the particular forms and seats of tuberculosis. When the malady affects external parts, as the lymphatic glands, the joints, the bones, &c., then the medicines above advised, more especially those last mentioned, will be found in general most serviceable; and in these the cod-liver oil may also be taken. When the mesenteric glands seem to be chiefly diseased, the preparations of iodine should be given in very small and much diluted doses; and this oil may also be brought to their aid; frictions over the abdomen, with oleaginous and stimulating liniments (*Form.* 306, 311), being additionally resorted to.

164. When the glands go on to suppuration, or when a discharge is furnished by them, or when external sores, fistulae, &c., appear, then strict attention should be paid to the digestive

and assimilative functions, and more especially to the states of the circulation and of the blood. Not only should the former functions be aided or corrected as advised above (§ 155, 156), but the blood should be improved whenever it appears to be thin or poor in red globules, by means of the preparations of iron; and of these, the judicious use of the compound steel mixture, or of the iodide of iron in the sirup of sarza, has proved most beneficial in my practice. In all scrofulous cases attended by suppuration or discharge, there is a marked tendency to alteration of the blood—to a state of anæmia, particularly as respects the coloured globules; and hence these medicines are the more required. In all cases, also, of open scrofulous sores, care should be taken to prevent, as much as possible, the access of the air to them; as the air not only injuriously affects the diseased surface, but it also alters the discharge from this surface, and renders it more irritating. Local applications, therefore, in these cases, should be employed with the view not merely of removing the morbid action of the part, but also of completely excluding the air, and of correcting the acrimony of the discharge.

165. When scrofula, in any of its open forms, attacks females, it is often complicated with either a delay of the catamenia, especially about or soon after the period of puberty, or with irregularity of some kind, or an entire suppression of this evacuation. In many instances an obstinate form of leucorrhœa accompanies the catamenial disorder, and not infrequently the scrofulous as well as the sexual disease has been induced or aggravated by the baneful vice of masturbation. Due attention should be paid to this causation and to this morbid association, as due inquiries on the part of the physician, and a careful supervision by the friends of the patient, may be productive of ultimate success in the treatment, which in general should be chiefly constitutional.

166. In some cases, it will be found advantageous to commence the treatment of scrofula, especially when it is internal, or the glands are chiefly implicated, and the tongue is loaded, with a smart emetic of sulphate of zinc, and to promote the emetic operation by means of the tepid infusion of chamomile flowers; and, having subsequently improved and promoted the secretions and excretions by the alteratives and stomachic aperients already mentioned (§ 155–157), to enter upon a course of either of the more energetic medicines as advised above (§ 160–162). When the scrofulous affection is seated in a gland, and has gone on to suppuration and fluctuation, the integuments being thinned and purplish, there can be no doubt as to the propriety of procuring the discharge of the matter by a small incision of the integuments, and of afterward protecting the orifice from the air. In cases of this kind, as well as in those attended by open sores, the state of the constitution, particularly as respects the blood, should receive attention; and the treatment ought to be especially directed to the improvement of the assimilative powers and of the blood, whenever they are in fault, either by the means already noticed, or by the other vegetable or mineral tonics generally in use.

167. Whenever any sexual disorder complicates the scrofulous taint, or any form of tuberculosis (§ 165), as will be frequently observed

in practice, meddling examinations, *per vaginam*, should not be instituted without sufficient reason. Most of these disorders will yield to the treatment advised for them severally, under their respective heads in this work, especially when conjoined with the medicines found most serviceable in scrofulous and tubercular affections. Indeed, the general indications and means of cure most appropriate to the one class are very frequently suitable to the other; and this remark need not be limited to the constitutional treatment, but be extended to the local also.

168. After the operation of an *emetic*, when it is required, the alvine secretions and excretions ought to be duly promoted by a combination of *stomachics* or *tonics* with *aperients* and *alteratives*, due regard being also had to the diet and regimen recommended above (§ 150, *et seq.*). As occasion may offer, the *mineral springs* and *baths* about to be noticed (§ 193, *et seq.*) may either be brought in aid of other internal or constitutional remedies, or may follow the use of these latter, or even be alternated with them.

169. iii. OF THE SEVERAL MEANS RECOMMENDED FOR THE CURE OF SCROFULA AND TUBERCLES. —When a person possessed of common sense hears of the numerous spells, charms, incantations, superstitious rites, &c., so frequently had recourse to in former days for the cure of scrofula, he considers them humiliating proofs of the credulity of the human mind, during ages commonly called dark, or only partially enlightened; and he is induced to form a comparison between those ages and present times, and to draw inferences which will probably be by no means in favour of the former. Superstitious and absurd notions and practices were no more then than they are now, confined to the lower classes of society, or to the uninstructed mind; and however lowering they may appear to the dignity of human nature, however irrational and impossible the results imputed to them may seem to the thinking, however devoid of those connexions which entitle the imputed causes to the credit of the reported effects, when any effect was even loosely observed, still greater absurdities, still more wonderful charms, more entrancing spells, more blind superstitions, and more gross impositions are credited, in this age of boasted civilization, of scientific advancement, and of mechanical contrivance and invention, and more numerous instances of blind credulity are daily manifested, than in ages of the darkest and lowest mental abasement.

170. Every where—in all ranks and classes, in all professions, and even among those reputed to be instructed, or learned, or even imbued with science—most absurd doctrines connected with the healing art, human impossibilities, the most ridiculous notions, the most extravagant assertions, are promulgated by knavish impostors, and believed in by credulous multitudes; the impudence of the former and the faith of the latter being the greater, the more devoid of truth these doctrines are, and the more they are opposed to good sense, to true science, and to honest dealing. When we find, as may be found at the present day, in the senate, in the hierarchy, in the judicial bench—among those who govern the country, who interpret and administer the laws, who profess to direct the religious belief of the community, not merely believers in, but also propagators of, the most absurd med-

ical doctrines and medical means—official meddlers in what they are incapable of understanding—abettors of the knavery of mischievous quacks—can the decadence of true medical science be far off? What is neither honoured nor rewarded must necessarily cease to be sufficiently, ardently, and patiently cultivated. If the impertinences of the ignorant, the impudence of the vulgar, the professions of the uneducated, are to be esteemed above the acquirements of the scientific and philosophic investigator, there must, at no remote period, be an end of the learning and science of those who shall hereafter assume the office and rank of physician.*

171. *A. Superstitious practices* have been adopted for the cure of external scrofula since the earliest ages, and have been of various kinds, the oldest being more or less connected with pagan or religious rites, and the most recent with certain medical doctrines and quackeries which influence more or less the faith or confidence of the patient. It is not unlikely that scrofulous sores formed no small part of the external maladies respecting which so ample a provision was made in the 13th, 14th, and 15th chapters of Leviticus, and for which the means were calculated no less to excite the faith and hopes of the patient, than to benefit the priests, who, in those ages and places of imperfect civilization, conjoined the healing art with the priestly office. During the earlier

* It is very generally believed that the patronage of quacks and quackeries—of impostors and of impositions—is to be imputed chiefly to ignorance; but this is only one of several sources to which it should be referred. Credulity, a tendency, even in the incredulous, to believe in whatever is confidently asserted, a disposition to admire whatever is unknown or unexplainable, the faith which many place in the impossible—the Catholic dogma—"Credo quia impossibile est"—have collectively and severally an influence on the minds of the majority—on those who will not take the trouble of looking closely into matters, or of thinking sufficiently for themselves, especially when they are either imperfectly or not at all acquainted with the natures and relations of such matters. It is not a little remarkable that, since the founding of the College of Physicians at the commencement of the 16th century, expressly with the view of preventing the injurious and irregular medical practices of the day, down to recent times, most of the quacks and quackeries, against which the college had to contend, were patronized by bishops and dignitaries of the Church, and by persons of high rank, as sufficiently set forth in GOODALL'S History of the College.

It would appear, at the present day, as if the aberrations of the human mind apparent in all classes and places, in matters connected with the disorders of the body, were the humiliating inflictions of Providence on those to whom the professions are as a worldly craft, science as a matter of traffic, and learning as an occupation of the memory involving none of the higher manifestations of the mind. The history of human delusion as to matters medical, and of the fashions which have successively engaged the weak and selfish respecting the ailments of their debilitated frames, shows that, in an era of luxurious indulgence, of exhausting vices, and of enervating enjoyments, the impudent assertions of impostors have a more powerful influence on the minds and bodies thus emasculated than the upright and rational advice of scientific and learned physicians. The victims of the former are either incapable of reasoning upon, or are too indolent to examine, the opinions and assertions which they practically adopt; and hence, of the several medical impostures of the present day, the most popular is that one which is the most extravagant in its pretensions, the most abounding in absurdity, and the most deficient in the least approach to truth. "*Probitas laudatur, et alget*"—honesty, however, is hardly praised; but dishonesty and assurance are more than praised—they are worshipped with a fervency equal to the extent of delusion they achieve—to the amount of their success—a success acquired only at the expense of human suffering, and by the sacrifice of human life, but worshipped nevertheless.

epochs of Jewish history, both prophets and priests had recourse to sprinkling with oil and touching the diseased parts for the cure of external sores; and, before the introduction of Christianity into northern countries, the Druids or priests, while they undertook the treatment of these affections, most probably adopted the same or analogous means. PLINY, TACITUS, and SÆTONIUS furnish some doubtful evidence of touching the sick having been resorted to as one of the means of healing; and it would appear, from the Scandinavian Eddas and Sagas, and from some German and French writers in the seventeenth century, that the practice of healing external sores by the royal touch existed in the northern countries of Europe as early as the eleventh and twelfth centuries, and was very commonly adopted from those times until the middle of the eighteenth century.* When the age and other circumstances in which external scrofula presents itself are considered, it may be safely inferred that a very large proportion of those who were thus touched recovered at indefinite periods after it was resorted to. The accession of puberty, the influence of the mind on the body, the change of living, of season, of air and scene, and the journey, when this mode of healing was confided in, and various related circumstances, combined to produce no mean constitutional effects, and thereby to remove the local manifestation of the constitutional evil. The transfer of nerve influence from the healthy to the sick, or any other mode of explanation which the modern mesmerist adopts to account for the effect, when effect was observed, could have but a small share, if any, in producing it; but at the present day mesmerism usurps the place of the royal touch, although with doubtful efficacy, unless it brings to its aid all the accessories which I have now mentioned, as well as many others aiding more or less in producing a constitutional as well as a local change.

172. *B. The preparations of iodine* are among the most efficacious remedies which can be prescribed for scrofula, when judiciously administered and combined; but, when improperly employed, they may be most injurious. I have employed them extensively both in public and private practice, from 1820 until the present time; and have generally commenced their ex-

* During the seventeenth and eighteenth centuries, the seventh son of a seventh son, and, still more, the ninth son of a ninth son, divided the laurels with royalty for their success in curing scrofula by the touch; the old numbers, as well as the rare occurrence of so prolific offsprings in succession, producing the cures as effectually as the high rank of the royal competitors. At the present day, the passes of the mesmerist profess to effect more than either the royal touch or the humbler ministrations of even the ninth son of a ninth son, wherever he may be found.

[With regard to the influence of the royal touch, it is well to recollect what is stated by WISEMAN, who wrote at the period it was practiced, viz., that part of the duty of the royal physicians and sergeant surgeons was to select such patients afflicted with scrofula as evinced a tendency towards recovery, and that they took especial care to select those who approached the age of puberty; in short, those only whom nature had shown a disposition to cure. The patient was thus secured from the importunities of art, and the efforts of nature left free and uncontrolled, and the cure not retarded or opposed by the administration of adverse remedies. We have no comments to make upon the spirit-rapping and clairvoyant systems of practice; the knaves who practice them, we trust, may yet be so situated as to do the state some service, if they cannot wholly compensate for the enormous evils they have inflicted upon communities.]

nibition in small doses, and often much diluted, always preferring to give them very soon after a meal. The preparations of iodine I have preferred are the iodide of potassium, the ioduretted solution of the iodide of potassium or the compound tincture of iodine, and the iodide of iron. The iodides of mercury are much more rarely indicated, and the iodide of sulphur is too irritating. The iodide of potassium I have often combined with the carbonate of potash, or with liquor potassæ, or with BRANDISH's alkaline solution, and sometimes also with preparations of cinchona, or of sarsaparilla, or with one or other of both. The iodide of iron should be given in sirup, especially the sirup of sarza. When scrofula is associated with syphilis, then the iodides of mercury may be given, or mercury may be prescribed night and morning, or otherwise employed, while the preparations of iodine are taken as just recommended.

173. During the exhibition of iodine in any form, especially if continued above a few days, the state and functions of the liver should be carefully watched; for iodine may, by passing directly into the portal circulation, excite, or even irritate, the liver to a very injurious extent. The preparations of iodine may be employed externally in various ways, either to the part affected, or by means of local or general baths. When applied to the diseased gland or part, care should be taken that they do not, by too great concentration, convert congestion into inflammatory action, or otherwise injuriously irritate the part. Baths containing the iodide of potassium, with or without the addition of sub-carbonate of potash, I have often found of much service, especially when brought in aid of internal means. Iodine, even when cautiously prescribed, may disagree with some constitutions. Its operation should, therefore, be carefully observed. It ought not to be too long employed without intermitting its use; and, during its exhibition, the urine should be examined and tested, not merely with respect to its acidity or alkalinity, but also as to the presence of albumen; and if the latter appear, the use of the iodides should be relinquished.

174. *C. Mercurials.*—Mercury, in the form of calomel, corrosive sublimate, and black sulphuret (Ethiop's mineral), was generally employed for scrofula during the seventeenth and eighteenth centuries. MAYERNE, BORDEU, MARX, and others prescribed it not only internally, but also to the scrofulous sores. HUFELAND resorted to mercurials with the belief that they removed the scrofulous irritation by virtue of a law of the animal economy, that different kinds of irritation destroy each other, or, in other words, that one kind of irritation removes, by superseding, the antecedent irritation. But in this he assumes two things, namely, 1st, that the morbid action consists of irritation; and, 2d, that it or any irritation may be removed by an irritant, neither of which he nor any other one has proved. But, while HUFELAND and others recommended mercurials, even until they produced salivation in the more obstinate cases, others, with equal justice, contended, with MORTON and GIRTANNER, that they were injurious when carried so far as to occasion salivation; and they were fortified in this by the obvious impropriety of prescribing a debilitating medicine for a disease essentially of debility.

175. At the present day, several other preparations of mercury have been resorted to, especially mercury with chalk, the iodide and sub-iodide, the bromide and sub-bromide, and the nitrate, externally. I have employed several of these, especially the iodides, with results similar to those already mentioned in respect of iodine; but the mercurial iodides require a careful observation of their effects. Mercury with chalk is an excellent alternative, and is often required to correct or to increase the biliary functions. Of all the preparations of mercury, the *corrosive sublimate* is certainly the most beneficial; but it should be prescribed in very small doses, and generally in conjunction with some preparation of sarza or of cinchona; and, when thus exhibited, I have found it almost equally efficacious with the preparations of iodine. It was much used by VAN SWIETEN, AKENSIDE, and their contemporaries. I have usually given it with the fluid compound extract, or sirup of sarsaparilla, or in the compound tincture or decoction of cinchona. In the more obstinate cases, a course of the sublimate may be alternated with a course of one of the iodides; and when the bones are at all implicated, this plan will generally prove efficacious, especially when aided by an appropriate diet and regimen.

176. *D. Preparations of Iron.*—Most of the preparations of iron may be given advantageously in scrofula, especially after morbid secretions and fecal accumulations have been evacuated. The preparations which I have preferred are, the ammonio-tartrate, the potassio-tartrate, the ammonio-chloride, the saccharine carbonate, the iodide, and the compound mixture of iron. Mention has already been made of the iodide (§ 172). The compound mixture of iron is one of the most efficacious, and I have usually prescribed it with an additional quantity of the carbonate of potash, or with solution of potash, with extract of conium and liquorice. The sulphate and muriate of iron were generally preferred by THILENIUS, THOMANN, and HUFELAND; and when the former can be taken in a pill, and when the latter is given in the form of the tincture of the sesquichloride, either of these is very beneficial. These preparations are most serviceable where there is any tendency to anæmia or chlorosis, and not less so when scrofula is associated with hysteria or disorder of the catamenia in any form.

177. *E. Chlorides.*—(a) *Chloride of Barium*—Dr. ADAIR CRAWFORD first contended for the anti-scrofulous operation of the muriate of baryta, and in this he was supported by FERRIAR, THOMANN, PEARSON, BUCHOLTZ, WESTRUMB, HUFELAND, PINEL, ARMSTRONG, WENDELSTADT, VERDIER, &c. But CHAPMAN, PORTAL, JADELOT, and others have not fully confirmed the opinions which were formerly entertained respecting it. The muriate of baryta had fallen into neglect for some time, its use having been superseded by medicines which were found more efficacious and less irritating to the stomach, when Dr. PIRONDI advised a more active employment of it. He prescribed six grains of the medicine in four ounces of water, and directed a tablespoonful to be taken every hour, excepting the hours before and after a meal. He increased the dose by six grains every day, until a drachm was given; and the patient was restricted to a vegetable diet and water. Having had some

acquaintance with Dr. PIRONDI, I was induced to make a partial trial of this plan in a few cases, but I could not succeed in giving more than ten or twelve grains in the twenty-four hours, and then it was given more diluted than he advises. Its irritating effects on the stomach frequently prevented me from prescribing more than six or seven grains in the twenty-four hours. It appeared to be more efficacious when given in moderate doses, either soon after or with the meals, than when taken in larger doses in the intervals. According to Dr. GLOVER, who makes a very favourable mention of the chloride of barium in scrofula, the *bromide* and *iodide* of barium has the same physiological action with the chloride, the iodide, moreover, acting energetically on the uterine system.

178. (*b*) *Chloride of calcium* was formerly much employed against scrofulous swellings and sores, and in similar states of solution to those in which the chloride of barium was prescribed. BEDDOES, ODIER, FRANK, and HUFFLAND have made favourable mention of this substance. The last-named of these writers, however, considered it more irritating than the chloride of barium, and that it, therefore, should be used more cautiously. Dr. SIMMONS stated it to be inefficacious, and Mr. PHILLIPS seems to be of a nearly similar opinion. "FOURCROY and the Dutch physicians had much confidence in its power over scrofula. BIERT for many years made much use of this medicine in the treatment of the scrofulous patients of St. Louis, without observing those inconveniences which are frequently attendant upon the use of baryta in full doses. It is the base of the anti-scrofulous nostrum of NIEMANN. I have frequently used it in the following form: a drachm of this chloride to twenty drachms of distilled water, of which a tea-spoonful was taken in milk two or three times a day. I have carried the dose up to two tea-spoonfuls, but not exceeded that dose. I am not satisfied that it has any evident action upon scrofulous glands, but it is more generally tolerated than the chloride of barium."—(PHILLIPS, *Op. cit.*, p. 282.)

[BENEKE has shown that the *phosphate of lime* in man, as well as vegetables and the inferior animals, is absolutely essential for the formation of cells, and he considers that many pathological states of the system may depend on a deficiency of this salt, such as ulcerations depending on a general dyscrasia, infantile atrophy, scrofula, and tuberculous diseases. Dr. STONE, of New Orleans, has, in consequence of these views, employed the *phosphate of lime*, in conjunction with *cod-liver oil*, in such cases, with very beneficial results, and we have no doubt it will prove one of our most valuable remedies in such cases. It is used in doses of from six to eight grains, three times a day.]

179. (*c*) There are other *chlorides*, as the *chloride of potassium*, the *chloride of zinc*, &c., which, if judiciously employed, may act beneficially in scrofulous swellings and sores. The *chlorate of potass* has been very frequently prescribed by me in this and in other cachectic diseases since 1819, and I can recommend it as one of the substances most deserving adoption in scrofulous affections. Dr. GLOVER remarks that his experiments prove the *chloride of potassium* to be much more energetic than the corresponding compound of sodium, although not so powerful

as the iodide of potassium. "There is scarcely a doubt but that the chlorides, bromides, and iodides of the same bases produce effects identically similar in kind, differing only in degree. The bromide of potassium is more powerful than the chloride, less active than the iodide. Not being so apt to occasion nausea as the latter substance, it may be used in cases where this might disagree."

180. *F. Solutions of chlorine—aqua chlorinæ*—and chlorinated solutions of the alkalies have considerable influence in the more cachectic states of scrofula. Dr. GLOVER observes that the strongest analogy, in physiological and medicinal properties, exists between chlorine, bromine, and iodine; and that any one of these bodies is capable of producing the effects which can be obtained from another; but that the different forms in which we must use them give rise to differences in action. "Thus the very slight solubility of iodine almost precludes its use in watery solution, and the convenience with which solutions of bromine can be prepared renders this body peculiarly adapted to form lotions for external application." Mr. POTTER and Dr. GLOVER have proved the utility of bromine used externally, eight or twelve minims of bromine being added to a pint or half a pint of water. I have directed one drachm of bromine to eight ounces of distilled water; and from five to twelve drops of this solution to be taken in any suitable vehicle internally; and from one to two drachms of the solution to eight ounces of water for external use.

181. *G. Alkalies* have long had a great reputation for the cure of tuberculosis and scrofula. They are much praised by HAMILTON, BLANKARD, KIRKLAND and FODÈRE, especially the carbonates and the solution of potass. These are, however, much less efficacious than BRANDISH's alkaline solution, which owes much of its efficacy to the lime which it contains. The alkalies should generally be conjoined with tonic or bitter infusions or decoctions, with chalybeates, as in the *mistura ferri composita*, or with deobstruent extracts, as taraxacum, gualiacum, sarsa, &c.; or they may be given in the form of common or medicated soap, in conjunction with these extracts, or with ammoniacum, myrrh, &c. I have frequently combined either of the carbonates, or the solution of potash, with the iodide of potassium, with marked advantage. The aerated alkaline waters may be made the vehicle for several other medicines in the form of tincture; and, when the bowels are lax or irritable, or discharges from any of the mucous canals are troublesome, then lime-water, or the aerated lime-water taken either alone, or with milk, or with other medicines, which the circumstances of the case will indicate, will be of great service.

182. *H. Acids* have rarely been found of service in scrofulous swellings, although they have often been given in certain states of tuberculosis, especially when affecting the lungs, and sometimes with benefit. I have found, however, the *nitro-hydrochloric acids* used internally or externally, or in both ways, of great service; and they may be employed either as the chief means, or in aid of other remedies. They are most beneficial when the functions of the liver are imperfectly performed, when the circulation is languid and weak, especially in the extremi-

ties, and when the hands or feet are cold. The *hydrochloric* acid was recommended by FERRIAR and JOERDENS, and I have prescribed it in scrofulous affections in the decoction or infusion of cinchona with much advantage. The nitro-hydrochloric acids may be taken either alone, or in bitter or tonic infusions.

183. *I. Tonics* of various kinds have been very generally recommended for external scrofulous affections, but not so frequently for internal tuberculosis as rational views of the nature of this malady might have suggested. The preparations of *cinchona* were much employed by WHYTT, FOTHERGILL, NORTHCOTE, and FORDYCE; and various bitter extracts and vegetable tonics by GROSSMANN, HUFELAND, and others. The connexion of scrofulous affections with debility, and with imperfect digestion and assimilation, indicates the necessity of having recourse to this class of medicines either as the principal means of cure, or as adjuvants, or as the vehicles of other more specific remedies. A solution of *pepsin* has been recommended as a tonic and promoter of digestion by Dr. TYLER SMITH. He gives it a quarter of an hour after every solid meal, and in larger quantity after dinner than at any other time.

184. *K. Cod-liver oil* and the *oil* from the livers of other species of the same genus have been recently much employed in the treatment of all forms of scrofula and tuberculosis. I have prescribed it since its use was revived; and I have had numerous occasions of observing its beneficial effects, especially when aided by such means as the peculiarities of the case should suggest. Its operation is not merely that of a nutrient, but it is also alterative, and it certainly produces more or less of a healing influence on ulcerated cavities or surfaces; these effects being the more manifest, the more recent the oil, and the less it is subjected to clarification and other chemical manipulations. I have usually found it most beneficial when taken on the surface of diluted lemon-juice, or on lemonade, or on the surface of the infusion of orange-peel, with or without a few drops of the solution of potash, or of BRANDISH's solution; or on water containing a few drops of the nitro-hydrochloric acids, or of the muriated tincture of iron. When there is much cachexy, or inaction of the liver, or more or less anæmia, these modes of exhibition should be preferred.

185. *L. Burned sponge* had once considerable reputation for the cure of scrofula, and to this it was chiefly indebted to ARNAULT DE VILLENEUVE, ASTRUC, LANE, RING, FODÈRE, and HUFELAND. I have had no experience of its effects; but that it was entirely without effect I cannot believe, although the quantity of iodine it contains is very minute. The animal charcoal which was thus formed might not have been entirely inefficacious, especially in correcting the contents of the alimentary canal; for which, indeed, powdered charcoal is extremely efficacious. LETTSOM, a sagacious practitioner, often had recourse to burned sponge, and sometimes gave it with calomel.

186. *M. Various substances* have been employed more or less empirically, or without any clear ideas as to their operation, or as to the amount of effect which may be ascribed to them.

—(a) Of the benefit which may be derived from

emetics and *stomachic aperients*, as advised by SCHMIDT, WEIKARD, and others, there can be no doubt, when prescribed at the commencement of the treatment, and when circumstances indicating their use are present. Several other substances were also much employed at different periods, and were probably not altogether without benefit, particularly as alteratives and restoratives, thereby improving the constitutional powers. Among these *guaiacum*, *sassafras*, the decoction of *walnut-leaves*, *willow-bark*, *hops*, *taraxacum*, *tussilago*, *cantharides*, *asafetida*, &c., held the most conspicuous places. RIVERIUS prescribed *gum ammoniacum*, both internally and externally; and I have seen much benefit derived from the *balsam of Peru*; and, in other instances, from *capsicum* taken internally, and from the external application of a weak infusion of it to scrofulous sores. Dr. TYLER SMITH has recently recommended the exhibition of *pepsin* in order to promote the functions of the stomach.

187. (*b*) *Digitalis* was formerly much employed internally against scrofulous and tubercular diseases. M. BAYLE (*Biblioth. Thérapeutique*, t. iii.) states that it was first prescribed by VAN HELMONT; and subsequently by HALLER and DARWIN, the latter of whom gave the powder in as large doses as five or six grains thrice daily. This substance was used also externally, either in the form of the infusion, or powder of the leaves, and the internal and external uses were conjoined. I have no experience of the remedy in scrofula, and I believe that it is more likely to prove injurious than beneficial. The *walnut-leaves* have lately been much recommended by M. NEGRIER; but I agree with Dr. GLOVER in considering them as only slightly beneficial as a tonic, when the preparations of these leaves are used internally, and as an astringent when applied externally, and as inferior to several other tonics and alteratives usually adopted.

188. (*c*) At the commencement of the last century *tar-water* was very much vaunted for the cure of every form of scrofula and tuberculosis, and some years ago I prescribed it largely, both internally and externally, in a stronger form, as a wash to scrofulous sores; and, from my experience of its effects, I consider it one of the most efficacious means which we possess, when aided by a suitable diet and regimen. I also gave the pure Norwegian *tar* in the form of pill by means of liquorice powder. Tar may be given more largely when made into pills with magnesia, but in this combination the pills often pass through the bowels without being dissolved. In the more indolent states of scrofulous sores, *creasote* may be substituted for tar-water, but my experience leads me to prefer the latter. The tar may likewise be made into pills with powdered charcoal or other substances, or be taken in gelatine capsules. This medicine is often very efficacious in the chronic cutaneous eruptions which occur in the scrofulous taint, or associated with any of the forms of scrofula or tuberculosis.

189. (*d*) During the 16th and 17th centuries, and more recently, a medicine was much in vogue as an alterative and restorative, not only in scrofula, but also in many other maladies, under the appellation of the *infusion of a thousand flowers*. This consisted of an infusion, either warm or cold, of the recent dung of cows

and bullocks feeding in open pastures. The only effect which this medicine could produce must be referred to the proportion of bile which it contained. That *ox-gall* is possessed of much efficacy, either alone or properly combined, I have shown in various parts of this work, especially in promoting the digestive and assimilating processes. It is readily procured in the states of inspissation and extract. I have prescribed it in the form of pill since 1820, and it is now kept by most of the chemists in this city. It is most beneficially used as an adjunct to other appropriate means, especially in the states of inaction of the liver, and when the bowels are weak and irritable.

190. (c) Since the work of STÖRCK on *conium* appeared, this substance has had great reputation for the cure of scrofula; and, although it has received the commendations of QUARIN, RUTTY, and many others, I am at a loss to recognise its virtues. The same remark applies to *digitalis*, which has been prescribed by MENZ, DARWIN, and HUFELAND. *Sulphur* in various states of combination is more deserving attention. I have often prescribed it in scrofulous affections, in conjunction with magnesia, powdered cascarilla, or aromatics and warm carminatives, with the view of promoting the cutaneous functions, which are often imperfectly performed (and this object it attains more permanently than most other means), and in order to promote the intestinal evacuations. *Camphor* was recommended internally by COPLAND, LETTSON, and FODÉRÉ, and externally dissolved in olive oil; and in this form it may be applied with gentle friction or more permanently. *Sulphate of zinc* was praised by WHITE, but it is much inferior to the sulphate, or other preparations of iron.

191. (f) *Electricity* was long since recommended by SIGAUD LA FOND for scrofulous swellings, and its use has been recently revived; but in whatever manner this agent may be employed, either as electro-galvanism, or as electro-magnetism, or as shocks from the Leyden jar, or as sparks from the parts affected, it is appropriate only to the more indolent and atonic states, and when the parts furnish no signs of acute inflammatory action.

192. *N. Change of air* to the sea-side, in connexion with sea-bathing, &c., has frequently a beneficial influence, and a considerable share of the benefit has been imputed to the sea-air. The amount of benefit has most probably been exaggerated, but I cannot think that it is without influence, especially when the body is duly protected from cold. Mr. PHILLIPS thinks that change to the sea-coast exercises no greater influence on scrofula than change to any inland situation where the air is pure and dry. For young persons and scrofulous children change of air is always beneficial, and when this can be conjoined with the use of sea-water and sea-bathing, I believe the benefit to be augmented; and, for this purpose, especially to residents in the metropolis or other large towns, there are no places more salubrious, during the months of June, July, August, and September, than Lowestoft and its vicinity, and the Isle of Thanet.

193. (a) *Sea and mineral waters* have always had a great reputation in the treatment of scrofulous and tubercular affections. Sea-water has been strongly recommended by RUSSELL, KIRK-

LAND, TOLBERG, and many others, both internally and externally; and of all waters it is certainly most generally appropriate and efficacious, if its use be judiciously directed. When it can be retained on the stomach, even in small quantity, it will generally be taken internally with benefit; and when the bowels are sluggish it is one of the best aperients that can be given. As a warm, tepid, shower, or cold bath, or used in washing or sponging the surface, it is also an excellent remedy. But when sea-bathing is adopted, especially for children, the period of immersion should be brief—short in proportion to their youth and the amount of debility; and, if alarm be caused by it, the shock should be avoided by substituting effusion on the surface by a sponge, or even by less alarming modes of employing salt-water. In some cases artificial sea-water may be used, or a solution of bay-salt, or this salt may be added to sea-water. Reaction should follow cold bathing; and when this is not manifested, either the period of immersion has been too protracted, or the means is too severe for the constitutional powers of the patient, and should not be persisted in.

194. (b) *Several mineral waters* are used with great benefit, both internally and externally, for scrofulous affections; but they should be prescribed with strict reference to the states of nutrition, circulation, and assimilation, otherwise but little advantage will be derived from them. Where the assimilative functions are much impaired, and more or less of anæmia exists, the chalybeate mineral waters of this country should be preferred; and these may not only be taken internally, but also used externally as baths, as advised by LENTIN and others. The several alkaline and sulphureous waters, as those of Bath, Harrowgate, Leamington, &c., are generally of service, especially when a deobstruent and alterative effect is required. Dr. GLOVER remarks that the mineral waters of Shap and Shotley, in the north of England, appear to be the best suited for scrofula, on account of the large quantity of alkaline and earthy muriates which they contain. Besides these, the mineral springs and the factitious waters of Carlsbad, Ems, Fachingen, Homberg, Kissingen, Seltzer, and of Barèges, Bonnes, Cauterets, Enghien, &c., have severally been recommended in scrofulous affections, and are more or less beneficial when judiciously employed, and aided by suitable medicines, diet, and regimen.*

195. *O. Medicated baths* of various kinds have been recommended for external scrofula. Those containing the iodide of iron, or iodide of potassium with the sub-carbonate of potash, or small quantities of the sulphuret of potash, are the most beneficial. I have prescribed baths with the sub-carbonate of potash alone, and believed them to have been of service. It is manifest that these can be viewed merely as aids of internal remedies.

196. *P. The local treatment of scrofula* requires

* [Our country furnishes a vast variety of mineral waters, of which the carbonated saline and ferruginous springs of *Saratoga*, the sulphur waters of *Avon*, *Richfield*, and *Sharon*, New York, and the White, Red, and Salt Sulphur Springs of *Virginia*, are the most celebrated. These are all well adapted to different forms of scrofula, in some of its stages, but the advice of a physician will be needed to indicate their respective adaptations to particular cases. Much of the benefit, however, is to be attributed to change of air and habits.]

merely a few remarks; for, if scrofulous glandular swellings receive an early attention, the internal or constitutional means described above, more especially the administration of the preparations and combinations of iodine, appropriately to the circumstances of the case, should be chiefly confided in. The treatment of scrofulous swellings should depend chiefly on the absence or presence of increased heat and redness. If either or both be present, very different means from those which are indicated when they are absent are required. As long as the tumour continues devoid of redness, of increased heat, or much tenderness, gentle frictions, with fresh olive oil, to which small proportions of spirits of turpentine and camphor are added, with or without a little soap, will generally be of service. The preparations of iodine, especially ointments, lotions, and tinctures of iodine, have been much employed to the affected parts. But these should be sufficiently mild not to irritate the skin; for when they are too strong, the irritation of the surface caused by them will extend to the parts underneath, and superinduce an inflammation which might not otherwise have occurred. The iodine ointment of the Pharmacopœia is much too strong, and contains too large a proportion of iodine as respects that of the iodide of potassium and that of lard. I have much preferred the ointments prescribed in the APPENDIX (see *Form.* 766-770); and even they should be cautiously applied, so as to avoid irritation and pain. If the swelling be painful, or if it be irritated by the friction, the compound tincture of iodine may be applied, more or less diluted, to the surface, or the lotions prescribed in the APPENDIX may be employed (see *Form.* 671-673); but the stronger of these should be very much diluted.

197. When inflammatory action appears, either in the surface of the swelling or in the subjacent parts, the more common applications for sthenic inflammation are seldom of service, but, on the contrary, are often prejudicial. The existence of pain in the swollen part should not be viewed as always indicative of inflammation, for where the former is most severe the latter may not be present. In these cases, the *unguentum iodinii plumbi* and the *unguentum iodinii opiatum*, in the APPENDIX (*Form.* 768, 770), are the most serviceable. I have also found the *unguentum calomelanos cum camphorâ* (*Form.* 757) of use. These ointments should be rubbed gently over the surface, without exciting irritation. If increased heat and redness continue nevertheless, warm and anodyne applications are frequently more beneficial. In these cases, either of the deobstruent ointments in the APPENDIX (*Form.* 761, 762) may be tried, as there prescribed or more or less diluted.

198. If the inflamed part goes on to *suppuration*, an early outlet should be given to the matter, as its retention contaminates the tissues which surround it, and, extending in more than one direction, often gives rise to sinuses. The *ulceration* consequent on scrofulous suppuration generally requires not only much attention to the general health, by the means above described, but also a pure air, and suitable diet and regimen. In addition to these, gently stimulating applications, consisting either of very weak ioduretted ointments or lotions—of ointments containing either the balsam of Peru or

a small proportion of the iodide of zinc—of lotions containing a few drops of the tincture of capsicum, or of one of the chlorides—will be used with benefit. The solutions of iodine recommended by LUGOL to scrofulous ulcers are the following:

	No. 1.	No. 2.	No. 3.
Iodine	2 grs.	3 grs.	4 grs.
Iodide of Potass. .	4 grs.	6 grs.	8 grs.
Distilled water. .	1 pound.	1 pound.	1 pound.

These, commencing with the weakest, may be used frequently, either as washes or lotions, or be injected into scrofulous sinuses.

199. *Q. The diet and regimen of scrofulous and tubercular subjects, whether infants, children, or adults, are in every respect the same as above recommended (§ 148-153) for the prevention and the hygienic treatment of scrofula and tuberculosis.* The chief of these means are animal warmth and suitable food during infancy; a pure, dry, moderately warm and uncontaminated atmosphere; due ventilation of the apartments, especially of bed-rooms; change of air, sea-air, and voyaging; a due regulation and subjugation of the passions, desires, and imagination; a light, digestible, and nutritious diet, avoiding stimulants or heating beverages; and regular exercise in the open air; due exposure to light and sunshine; early and regular hours for sleeping and waking, and for meals; and attention to the states of all the secretions and excretions—the cutaneous, intestinal, and urinary—are the most conducive, not merely to the prevention of scrofula and tuberculosis, but also to the recovery of health in all the forms in which these states of disease manifest themselves.

[With Drs. STOKES, WARREN, and others, we hold that there is nothing *specific* in the character of scrofula, or reducible to the supposition of a *virus* existing in the system; but that its essence consists essentially in a slow irritation of the lymphatic system, occurring in persons who have a preponderance of white fluids and white tissues. This may be hereditary (congenital) or acquired, and when acquired, it is superinduced by the causes pointed out so fully by our author; all of which tend to diminish the proportion of the red tissue, to give a preponderance to the lymphatic system, and lower the vitality of the system. The scrofulous diathesis implies an *arrest of development*, an excess of the white, and diminution of the red tissues, and not in any specific virus, as many suppose, which is to be eradicated also by specifics. The blood is albuminous, the proportion of fibrin and red globules small, the muscles, consequently, weak and flabby, and all the symptoms indicate a weakened state of the vital forces. The indications then point to such curative means as tend to invigorate the system and add to the existing sum of vitality.

The *extractum carnis*, as recommended by LIEBIG, will be found, as it has hitherto proved, well adapted to the treatment of scrofula and tuberculosis. The manner of preparing it is to take *one pound* of lean beef, free from fat, chop it fine, as for mince-meat; mix uniformly with it its own weight of cold water; heat slowly to boiling; after boiling about two minutes, strain through linen. Salt may be added, or other condiments, to suit the taste. Prepared thus, it is

admirably adapted to cases of scrofula, phthisis, &c., especially where there are derangements of the digestive organs, such as ulcerations, dyspepsia, tubercular deposits in the intestinal glands, &c., as well as to the early and later periods of typhus, sloughing of the cellular tissue, and copious suppuration. One ounce of the "*extractum carnis*," thus prepared, is equal to 32 ounces of meat, and, being in a state of fine solution, may be readily assimilated, without much exertion of the digestive organs. The remedial properties of alimentary substances deserve more attention from the profession, as they are often far more efficient agents in combating disease than strictly pharmaceutical agents, which may stimulate languid organs, but do not renovate, by supplying new material. We would not advocate the doctrine that no substances should be used as remedies, in this or other diseases, except such as help to constitute in health the solids and fluids of the body; but we do hold that in such diseases as scrofula, tuberculosis, general cachexy, &c., where there is a vitiated and impoverished state of the blood, and corresponding affection of the solid tissues, the true indication is to supply a more nutritive material by way of aliment, and in such form as will be most easily assimilated. Quinine, iron, iodine, and other agents, which act dynamically or chemically, are to be used only as adjuncts, and with due regard to the state of vital force and organic nervous power.

M. NEGRIER, of Angers, found a strong infusion of *walnut-leaves*, taken internally and applied as a wash to scrofulous sores, very efficacious in the treatment of the disease. Twelve out of seventeen scrofulous children, nine of whom had osseous enlargement with caries, seven ulcerated glands, and one several swollen cervical glands, with scrofulous ophthalmia of both eyes, were cured by the above remedy after a course of six months' treatment, so that M. NEGRIER considers that the *walnut-leaves* are superior to all other anti-scrofulous remedies. —*Brit. and For. Rev.*, Oct., 1841.

A new remedy has lately been introduced into some of the French hospitals, called *extract of blood*, which promises to be of service in scrofulous and endemic subjects. It is prepared from fresh beef's blood, allowing it to coagulate, deparating the serum through a filter, and drying the clot by evaporation until it can be readily reduced to a powder; of which from 10 to 20 grains are given three or four times a day. This, as will be perceived, is only another form of the "*extractum carnis*" of LIEBIG; whether it will prove a perfect substitute remains to be proved.

With regard to *iodine* in scrofulous affections, we have used it very extensively in dispensary and private practice for many years, and think we have seen the most marked and unequivocal benefits from its employment. We have generally employed the *sirup of iodide of iron*, which will be found to suit a majority of cases better than any other preparation. It must be continued, however, for a considerable period, in conjunction with cutaneous friction and cold sponging, and a nutritive diet of animal food; these, with abundance of active exercise in the open air, will usually produce decided amendment. Some of our ablest physicians, however, are somewhat skeptical with

regard to *iodine* in this affection. Dr. J. C. WARREN remarks, for example, that "after many years' trial of the preparations of *iodine* in various forms of scrofulous affection, I have rarely seen any very distinct advantages from it. I have employed it in large and small doses, in hospital practice and private, externally and internally; nor, in truth, ought we to allow ourselves to expect the results which have been promised. Scrofula is a constitutional disease. If there be any remedy for such a disease, it must be found in agents which influence the intimate structure of the body more generally and intimately than iodine, or any medicinal substance can do. Such agents are food; a healthy state of the excretory apparatus; a pure atmosphere; and an exercise of the muscular system, suited to the constitution of the patient. I do not wish to dissuade from the use of so convenient a medicine as iodine; but would advise it to be employed in such a way as not to disturb the functions which remain healthy; and that it never should be used to the exclusion of those restorative means to which reason and experience have given their sanction."—*Surg. Observations on Tumours*, p. 164.

Cod-liver oil has now been sufficiently tried in diseases of a cachectic character to have its value properly determined. Our experience with the article more than 20 years ago in dispensary practice, fully satisfied us of its important remedial influence in scrofula, &c., although, from carelessness in its preparation, it was too nauseous to be borne well in a very large proportion of cases. But where it was retained, and did not derange the appetite, it produced the most marked benefit. Such is the experience of a large majority of those who have employed it. Dr. GERHARD states that it has proved of great service in the Pennsylvania Hospital, that the tuberculous patients to whom it was administered increased in flesh, weight, and strength under its use; that the cough and expectoration diminished, and in some cases the hectic and rigours wholly disappeared, and the patients resumed their usual occupations. The improvement of the physical signs was not coincident with that of the general symptoms; and, where the disease terminated fatally, the appetite, nutrition, and strength appeared for a time to be decidedly increased—life appeared for a time to be temporarily protracted; but for a few weeks preceding dissolution the remedy seemed to have lost its value. It was also found necessary to continue its use for some time after the most striking symptoms of the disease had disappeared. It was generally taken before meals, in milk or porter, sometimes clear, and where it produced nausea, the pale oil was substituted for the brown, and it was given after eating. For a large array of testimony in favour of cod-liver oil in scrofula, rickets, tuberculous cachexy, see "*New Remedies*," by Prof. DUNGLISON, ed. 1851, p. 552-4.]

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SCURVY.—SYNÓN.—*Scorbutus*, Sauvages, Vogel, Cullen, &c.—*Scorbutus Nauticus*, Young. *Porphyra Nautica*, Good. *Scharbock*, *Skorbut*, Germ. *Skiorbug*, Dan. *Scorbut*, Fr. *Scorbuto*, Ital. *Scorb*, *Scharbock*, *Skörbut*, *Scorbic*, &c., Saxon; hence *Scorbutus*, *Scurvey*.

CLASSIF.—4th Class, Cachectic Diseases.

3d Order, Impetiginous Affections (Cullen). 3d Class, Sanguineous Diseases.

4th Order, Cachexies (Good).—CLASS IV.,

ORDER IV. (Author in Preface).

1. DEFIN.—*Lassitude, debility, lowness of spirits, fetor of the breath and sponginess of the gums, followed by livid sub-cutaneous patches and spots, especially on the lower extremities and roots of the hair; and, lastly, by spontaneous hæmorrhages from mucous canals, by contractions and pains of the limbs, and superficial ulcers, &c., the disease proceeding from an alteration of the blood, caused by the nature of the food, and chiefly by the privation of fresh vegetables and fruit.*

2. I. HISTORICAL SKETCH.—Some writers have supposed, with SENNERTUS, MEAD, and MILMAN, that scurvy was known to the ancients, while others have believed, with FRIEND, that there is nothing to be found in their writings to warrant this supposition. HIPPOCRATES, in mentioning enlargement of the spleen—*σπλὴν μέγας*—notices but one symptom which is applicable to scurvy, and that is ulceration of the legs; and, in describing *Convolvulus Sanguineus*—*Εἰς δὲ αἰματίνης*—he adduces the dark discoloration of the skin, the eruption of ulcers on the legs, and the difficulty of walking, as more particularly distinguishing it; but these remarks are insufficient to show that he was actually acquainted with true scurvy. It has been supposed that the disease, with which PLINY states the army of CÆSAR GERMANICUS to have been afflicted after a long encampment in Germany beyond the Rhine, near the sea-coast, and which was ascribed to the water which was drank, was that now under consideration. He states that “the teeth dropped out, and the knees became paralytic. The physicians called the malady *Stomacace* and *Sclectyrbe*. They discovered a remedy against it, viz., *Herba Britannica*.” What this plant, of which PLINY adds a very short and imperfect description, actually was has not been shown by his commentators. Subsequent ancient writers, not even the Arabians, have furnished any thing in addition to what I have now adduced.

3. The earliest account of scurvy is that given by the Sieur JOINVILLE, as it appeared in 1260, in the army of Louis IX. in Egypt, owing to the nature and scarcity of the food, and the scarcity of water. The next notice taken of it is by FABRICIUS, who states that it was very prevalent and fatal in Misraia during 1846. As soon as

long voyages were undertaken, scurvy appeared in an unmistakable form. During the voyage of VASCO DE GAMA, who first made the passage to the East Indies by the Cape of Good Hope, more than 100 of his men out of 160 died of this malady. The History of Portuguese discoveries, by W. LOPES DE CASTENNADE, contains the relation of this voyage which furnished the first account of this disease as it occurred at sea.

4. That scurvy was not then, nor for some time afterward, known, is evident from the account given by CARTIER of his second voyage to Newfoundland in 1535. After mentioning the characteristic symptoms, he adds that, “about the middle of February, of a hundred and ten people there were not ten whole.” “Eight were already dead, and more than fifty sick, seemingly past all hopes of recovery. This malady being unknown to us, the body of one of our men was opened, to see if by any means possible the occasion of it might be discovered, and the rest of us preserved. But in such sort did the calamity increase, that there were not now above three sound men left. Twenty-five of our best men died, and all the rest were so ill that we thought they would never recover again, when it pleased God to send us the knowledge of a remedy for our health and recovery.” The remedy was a decoction of the leaves and bark of a tree, which was called by the natives *ameda* or *kamuda*, and which has been considered to have been a species of spruce-fir.

5. Dr. LIND states that the name of this disease is said to be mentioned in the history of Saxony, by ALBERT KRUNTZ; and if so, he will be found the first author now extant who calls it the scurvy. It is next taken notice of by EURITIUS CORDUS in his *Botanologicon*, published in 1534, where it is observed that the herb chelidonium minus is called by the Saxons *Schorbock rout*, being an excellent remedy for that disease. In the year 1539, it is mentioned by J. AGRICOLA in his *Medicina Herbaria*. OLAUS MAGNUS, in his history of the northern nations, published in 1555, observing what diseases are peculiar to them, gives a long description of scurvy, mentioning that it is vulgarly called *Schoerluck*, which is synonymous with the cachexy of the Greeks. He refers it chiefly to the nature of the food, and mentions that the habitual use of absinthiated beverages is had recourse to in order to prevent and to cure it. About this period, four treatises on the disease were published by RONSSSEUS, ECTHIUS, WIERUS, and LANGIUS. FORESTUS states that the description by ECTHIUS was contained in an epistle sent in 1541 to BLENBURCHIIUS, a physician in Utrecht. The first book published expressly on scurvy was by RONSSSEUS, who remarks, in a reprint, that if he had first seen the accurate description by WIERUS, his own should not have been published.

6. WIERUS states that scurvy had been long peculiar to the inhabitants of the countries near the North Seas, and that he had never met with it in Spain, France, or Italy, nor in Asia or Africa. There can be no doubt of the existence of scurvy in the northern countries of Europe from the earliest ages, although no account of it had appeared previously to the appearance of the works now mentioned; and it is equally manifest that years of scarcity, wars, sieges, &c., must have rendered it more or less endemic, or even epidemic, in various places and localities. During

severe winters and early spring, the food of the inhabitants of these countries, the dried and imperfectly-cured meats and fish, and the want of succulent and other vegetables, particularly in the countries adjoining the Baltic, and the Northern and German Oceans, must have occasioned a remarkable prevalence of this malady, even although nature had provided them with the best preventives and means of cure in the spruce-fir, and numerous other antiscorbutic plants and herbs with which they abound. The comparatively recent culture of succulent vegetables, and more especially of the potato, in these countries, accounts not only for the rarer appearance of this malady in these parts in recent times, but also for the prevalence of it during earlier ages.

7. Of the four ships which sailed from England the beginning of April, 1609, for the establishment of the East India Company, three were so severely visited by scurvy as to have lost nearly one fourth of their crews when they arrived at the Cape of Good Hope. The commodore's ship was not attacked. This immunity arose from three table-spoonfuls of lemon-juice having been served daily to each of his men. Notwithstanding this evidence of the success of lemon-juice in preventing scurvy—evidence the most conclusive—this valuable remedy and preventive was altogether slighted for 150 years afterward, although scurvy destroyed often one half or three fourths of the crews of our fleets, and was even more destructive to our armies than either battles or sieges, independently of the deaths it occasioned, both on land and at sea, in trading vessels. Sir R. HAWKINS states, in his observations on his voyage to the South Sea in 1593, that upward of ten thousand mariners had died of scurvy under his own observation alone, during the twenty years that he had been at sea.—(PURCHAS'S *Collect. of Voyages*, vol. i. and iv.) Admiral HOSIER, who sailed in April, 1728, with seven ships of the line to the West Indies, buried his crews twice, and died broken-hearted in consequence. Lord ANSON's expedition, at the end of two years from its leaving England in 1740, had lost from this disease more than four fifths of the number that sailed in it. The voyages of DRAKE, CAVENDISH, DAMPIER, BYRON, and of numerous other navigators, furnish similar details, and show how recklessly the lives of sailors were sacrificed.

8. But it was not only in fleets and single ships that scurvy was so destructive, but also in towns, fortifications, camps, and armies, and wherever the population was subjected to the causes which occasioned it in fleets. That scurvy was endemic, and also epidemic, in northern European countries, has been stated to be manifest from the early works on the disease, and from the nature of the food upon which their inhabitants subsisted. Owing to the difficulty of procuring fresh, succulent vegetables, and from their ignorance of the disease and of its several preventives and cures, the early frequenters of Hudson's Bay, of Newfoundland, and the coast of Labrador, were frequently almost altogether destroyed; and the early French settlers in Canada experienced so severe losses in winter and early spring from this disease, as almost to induce them to abandon the settlement.

9. While sporadic cases of scurvy were of

frequent occurrence, the ravages of the disease were often great in winter and spring, especially in years of scarcity, and in besieged towns or fortifications, and in armies. VANDER MYE states that, during the siege of Breda by the Spaniards in 1625, the garrison and inhabitants were grievously affected by this disease, 1608 soldiers having been attacked up to the fourth month of the siege, the numbers having increased daily until the place surrendered in June, after a siege of eight months. BACKSTROM has recorded that, in 1703, when Thorn, in Prussia, was besieged by the Swedes, 5000 of the garrison, besides many of the inhabitants, were carried off by scurvy during the five month's siege; the besiegers being altogether exempt from it. During the war between the Austrians and Turks in 1720, "when the imperial army wintered in Hungary, many thousands of the common soldiers, but not one officer, were cut off by scurvy. Dr. KRAMER, physician to the army, being unacquainted with a remedy for it, requested a consultation of the College of Physicians at Vienna. Their advice was, however, of no avail; the disease, which broke out at the end of winter, continued until, at the approach of summer, the earth became covered with greens and vegetables." BACKSTROM (*Observat. circa Scorbutum*, &c., 1734) states, that both in the siege of Thorn and in the imperial army, as soon as the former was raised, and vegetables and greens from the country were admitted into the town, and when the latter procured the same articles of food, the disease entirely disappeared. From these and other facts, he concludes that an abstinence from recent vegetables is altogether and solely the cause of the distemper, and so these alone are its effectual remedies.

10. Dr. NITZSCH, in 1747, gave a detailed account of the prevalence of scurvy in the Russian armies, especially at Wiburgh, and during the siege of Asoph, in 1736. At these and other places, the mortality was great during winter and spring, and was, as on most other occasions, ascribed to the unwholesome nature of the food, and the want of fresh succulent vegetables. In the spring of 1760, the British troops, forming the garrison of Quebec after its capture from the French, suffered so severely from cold, and the want of vegetables, that, before the end of April, 1000 of them were dead of scurvy, and more than twice that number unfit for service. M. PONÉRE states that scurvy was remarkably prevalent in the French army of the Alps in 1795; and LARREY says that, in 1801, during the siege of Alexandria, which was commenced in May, and ended with August, 3500 scorbutic patients were received into the military hospitals of the city. During the war in Siam and Ava, the native and British troops suffered most severely from scurvy and scorbutic dysentery,* owing to causes which will be referred to in the sequel. In 1836, the troops in the province of Adelaide, near the Cape of Good Hope, also suffered severely from scurvy, although abundantly supplied with good fresh meat; but they had been long without fresh vegetables and fruit. Scur-

* During 1827, the directors of the East India Company allowed me to inspect the regimental and other returns preserved in the India House, respecting the Causes, Nature, and Treatment of this disease as it occurred in the expedition to Ava, and of the cholera then prevalent in India.

vy was seldom or never seen in Great Britain since the end of the last century, up to 1847, excepting in jails and penitentiaries. In 1823 it appeared in the form of scorbutic dysentery in the Millbank penitentiary, owing to a poor and watery diet, without fresh or succulent vegetables; and, in 1836, 1837, and 1838, it occurred in several jails, owing to the same causes, more especially to the privation of fresh succulent vegetables. During the early months of 1847, 1848, and 1849, scurvy has appeared in various parts of England, Scotland, and Ireland, owing chiefly to the potato-blight. The *Literary History* of this disease will more fully appear from the BIBLIOGRAPHY AND REFERENCES appended to this article.

[It would seem that scurvy has almost invariably attacked the early colonists of northern latitudes, while those within or near the tropics have, from the abundance of fruits and vegetables, escaped. The early Massachusetts colonists, especially those who came in the Mayflower, and landed at Plymouth, Massachusetts, were dreadfully afflicted, more than half having died the first season. This disease has occasionally appeared in the United States army and navy; but more frequently among our merchant whaling vessels, which continue for many months at sea—in which there is little regard paid to personal cleanliness, and which are often excessively filthy and offensive. Notwithstanding, there is no instance on record, so far as we know, where the disease has prevailed on board of any vessel which had a good supply of fresh potatoes. In 1809, the scurvy proved very fatal among the United States troops on the lower Mississippi, 600 men having fallen victims to it. From 1819 to 1839, it prevailed occasionally in the United States army, sometimes proving quite fatal, as at Council Bluffs and St. Peter's, in 1820, when there were 503 cases and 168 deaths. It also was observed to some extent during the Florida war, in 1837 and 1838 (FOVRY), and also among the American troops during the late Mexican war. Dr. FALTZ, surgeon, has described the disease as it existed on board the United States squadron in the Gulf of Mexico, in the summer of 1846 (*Am. Jour. Med. Sci.*, vol. xv., N. S.); and within the last two years it has committed extensive ravages among the early colonists, especially the miners, in California.]

11. II. DESCRIPTION.—i. Of the *symptoms of scurvy*, the earliest are observed in the countenance. The face, as well as the rest of the surface, is pale and bloated. The carunculae of the eyes and lips have a dirty or greenish hue. The expression of the features is depressed. The gums are swollen, spongy, soft, livid, and bleed on the slightest friction. The odour of the breath is offensive. The patient complains of lassitude and debility, frequently of pains in the lower extremities, resembling rheumatism. He is averse from any kind of exertion; and when he attempts to exert himself he complains of stiffness of the joints, feebleness of the limbs, of panting or breathlessness, and of extreme fatigue. The skin is dry and harsh, and it generally continues dry throughout the course of the malady. Sometimes it is rough, resembling the goose-skin appearance; but it is more frequently shining, with patches, streaks, or spots of a reddish-

brown, bluish, greenish, black, or livid hue, resembling those following a severe bruise. The size of these patches varies from a small point to that of a handbreadth, and it generally increases with the progress of the malady. The patches are first observed, and are most numerous on the legs and thighs; but they soon appear on the arms and trunk, and on the scalp; very rarely on the face, which, however, assumes a more dingy and bloated hue. The ankles swell, and the legs and feet become oedematous. In addition to these, the patient often complains of shifting pains; and, if the disease have supervened upon rheumatism or ague, these pains are more or less severe, and are referred to the bones, to the back, thorax, or joints. When the disease follows ague, obscure or irregular remissions or intermissions of febrile symptoms are observable, and more or less enlargement, with pain in the region of the spleen, is often detected. The above may be considered as the *first or early stage* of the distemper.

[As described by our naval surgeons, “lassitude and debility” are not usually among the symptoms which usher in this disease; on the contrary, there is generally great activity, and not unfrequently cheerfulness, good appetite, and sound sleep at night, for weeks after the teeth were loosened, the gums ulcerated, the limbs oedematous and discoloured. The nervous symptom was commonly the last to be invaded, and then it was not an indisposition to corporeal exertion, but an actual disability. The countenance became pale, languid, cadaverous, the respiration oppressed and irregular, and the pulse feeble, fluttering, intermittent, simultaneous with this muscular prostration. Slight efforts to turn, sit up, or move about, were followed by tremours and syncope; and these symptoms usually indicated an early fatal result.]

12. These symptoms may continue a longer or a shorter time, or may be removed quickly by an appropriate treatment; but otherwise they may remain stationary; or, if the cause continues, they increase in severity. The gums become more tumid, more livid, and bleed from the slightest touch, and the breath remarkably offensive; the patches on the surface of the body enlarge, increase in number, and present a deeper and darker ecchymosed appearance. The pains are more severe, and are accompanied with swellings of the hams, stiffness and contractions of the knee-joints and ankles, and often with a brawny feel of the parts, owing to effusion of lymph between the integuments and aponeuroses, preventing the motion of the skin over the swollen parts. With the exudation of lymph, red globules, &c., into the tissues, chiefly into the connecting cellular tissue and periosteum, exudations of blood take place, giving rise to more or less marked hæmorrhage from mucous canals, especially from the nostrils, mouth, and bowels, and from the vagina; much more rarely from the bronchi, urinary organs, and stomach. The tendency to hæmorrhage increases with the progress of the malady, and the loss of blood is often so great as to rapidly sink the vital powers of the patient. In this *advanced stage*, the livid patches are generally associated with hard and painful swellings in various parts, particularly in the lower extremi-

ties, and in the calves of the legs; and these often pass into superficial fungous ulcers. Old cicatrices frequently open afresh, and become the seats of foul scorbutic sores. The teeth fall out; the gums present foul, livid, spongy ulcers. The respiration becomes remarkably short and hurried on the least exertion, and deliquium or faintness is apt to supervene. The contractions of the joints, the œdema, induration, and pain of swollen parts, the discoloration of the patches, and the number of the ulcers, are all more and more developed, and the debility and vital depression greater.

13. From the commencement of the disease the *alvine evacuations* are more or less disordered. The stools are morbid; but at first they are not so remarkably so as to attract attention, and costiveness is then often experienced; but, as the disease advances, they are not only much disordered, but are much more frequent, and very offensive. Diarrhœa and colicky pains often supervene, and, with more or less attendant hæmorrhage, rapidly sink the patient at this stage. Under certain circumstances, the disease passes into a state of scorbutic dysentery, or dysentery and scorbutus supervene upon each other, and thus become associated, as shown when treating of DYSENTERY (see that art., § 39, et seq.). The urine is scanty and high-coloured (see § 20).

14. The pulse is often little affected at an early stage, but is more generally slower and feebler than in health; but in more advanced cases, or when the malady is associated with some degree of asthenic or sub-inflammation in the seats of effusion, the pulse is often remarkably frequent, as well as small or weak. When the pulse is slow and feeble, the patient is often chilly, the surface cool, and the temperature of the body lower than natural. This state of the disease was called the *cold scurvy* by the earlier writers. When much swelling and hardness, with pain, is occasioned by effusion in the connecting cellular tissue, or even below the peritoneum, the pulse is generally frequent, varying from 100 to 120 in a minute, probably owing to some degree of inflammatory irritation produced by the effused matters in these situations, as indicated by the great tenderness which always is present. This state of febrile action gave rise to the distinction of *hot scurvy*, according to various authors.

15. The tongue is generally clean and pale, but commonly broad, flabby, and indented at its edges by the teeth. The insides of the cheeks and lips are pallid, and contrast remarkably with the appearance of the gums. Thirst is not much complained of, unless in the more febrile state of the disease, or when the supply of fluids is scanty. The appetite is not impaired. It may be even greater than in health; and digestion is not very manifestly impaired. Sleep is not deficient, unless at a far advanced stage, when wakefulness or disturbed sleep is experienced. The mental faculties are not impaired, although the spirits are generally more or less dejected and anxious; but towards a fatal issue the patient becomes indifferent and torpid. The memory is generally unimpaired, but the eyesight is occasionally weakened.*

16. As the disease approaches an unfavourable issue the *breathing* becomes remarkably frequent, and the *dyspnœa* extreme. The patient coughs, and expectorates a frothy mucus, sometimes tinged with dark blood. The chest was generally every where resonant on percussion; the respiratory murmur was loud and distinct; and the sounds of the heart were loud and extensive, but unaccompanied by any morbid bruit in six cases examined by Dr. Bunn. In the most advanced states of scurvy, not only may ulcers, and injuries or wounds which have healed up for many years, break out afresh, but old and well-united fractures may become disunited. The tendency to *swoon* in the most severe cases is sometimes so great that the slightest motion, or the erect posture, or even any trifling exertion, may be followed by fatal syncope. It is stated in the account of Lord Anson's voyage, that many of the men, although confined to their hammocks, eat and drank heartily, were cheerful, and talked with much seeming vigour, and in a strong tone of voice; and yet, on their being the least moved, although it was only from one part of the ship to another, and that in their hammocks, they have immediately expired; and others, who have confided in their seeming strength, and have resolved to get out of their hammocks, have died before they could reach the deck. And it was no uncommon thing for those who could do some kind of duty, and walk the deck, to drop down dead in an instant, on any endeavour to act with their utmost vigour.

17. Emaciation is not necessarily a phenomenon of the disease, unless there has actually been considerable privation of food; but it is occasionally observed, and anæmia is not infrequent. Dr. Bunn observes that, although there is a remarkable tendency to the breaking out of old ulcers or wounds long previously healed, yet there is very little disposition to the occurrence of bed-sores from pressure. The separation of the epiphyses from bones has been mentioned by some writers as having occurred in children attacked by this malady, but it has not been often observed in adults, or, if observed, not mentioned by many writers.

18. *Scorbutic ulcers* exude a thin, fetid, sanious fluid, instead of pus. Their edges are of a livid colour, and, as if puffed up, a coagulum soon forms on their surfaces, which is separated or wiped away with difficulty. The parts underneath it are soft, spongy, or putrid. When this coagulum is removed, the same change again occurs after a few hours, forming a soft, bloody fungus, resembling boiled bullock's liver.

of the disease as it existed on board the United States frigate Columbia in 1843, and also by Dr. FOLTZ, U. S. N. The blindness is represented as coming on soon after sundown, the conjunctiva becoming injected, when the blindness was so perfect as to prevent vision, even at a few inches distance. Dr. FOLTZ, in his history of the disease, as it appeared on board the United States frigate Karitan, remarks as follows: "Nyctalopia occurred in five, and hemeralopia in two cases. One case of the latter was so bad that the patient could not move about the even decks, with which he was perfectly familiar, without the greatest difficulty. There were other affections of the eyes, owing obviously to this scorbutic diathesis, such as inflammation of the conjunctiva, induration, and irritation of the cilia, accompanied with a copious acrimonious discharge. The usual collyria were used without any benefit, and the eyes improved or became worse in proportion to the arrest or progress of the scurvy; and ultimately, as the disease was eradicated, the ophthalmic affections permanently disappeared."—*Loc. cit.*]

* [Nyctalopia, or moon-blindness, is a symptom which is not uncommon as a precursor or attendant on scurvy, and has been particularly noticed by Dr. COALE in his account

This fungus exudation, Dr. LIND states, sometimes rises in a night's time to a great size, and, although cut off, in which case a plentiful hæmorrhage generally ensues, at the next dressing is as large as ever.*

19. ii. THE CHEMICAL ANALYSES OF THE BLOOD AND URINE in scurvy have been few, and even these unsatisfactory. It is manifest that the states of the blood and of the excretions in this disease will depend much upon the treatment adopted, and upon the time during which the treatment has preceded the analysis.—A. SIMON'S "Animal Chemistry" furnishes no information as to the blood in scurvy; but Dr. DAY, in his additions to the work, states that Mr. BUSK, in three well-marked cases of scurvy, found the composition of the blood as follows, comparing the scorbutic blood with the healthy, according to his analysis of the latter :

	1st Case.	2d Case.	3d Case.	4th. Healthy Blood. (Busk.)
Water	849.9	835.9	846.2	788.8
Solid constituents.	150.1	164.1	153.8	211.2
Fibrin	6.5	4.5	5.9	3.3
Albumen	84.0	76.6	74.2	67.2
Blood-corpuscles.	47.8	72.3	60.7	133.7
Salts	9.5	11.5	10.9	6.8

Although the fibrin appears to be increased, its vital cohesion is evidently impaired; and the albumen is certainly altered in quality, although the alteration is not shown by chemical analysis.

* [Dr. FOLTZ, United States navy, maintains that the *Land Scurvy* (*Morbus maculosus*, Werlhofii) is a "totally different" disease from *Sea Scurvy*. "In their symptoms there is, in the early stages, a slight assimilation; but, as they progress, in their pathological character they are perfectly dissimilar. Among the troops employed in Florida during the Seminole war, the morbus maculosus committed extensive ravages. Nyctalopia was a common symptom; some thirty cases of the disease occurring among the marine corps, co-operating with the army, were transferred from the field to the Marine Hospital at Washington, then under our charge. These cases, as well as a number we witnessed at Point Isabel, in May, in the forces engaged under General TAYLOR, were totally distinct from the scurvy as it occurs on board ships at sea. Purpura oedema, the cadaverous and fetid effluvia which follows the extreme emaciation, the fainting upon the slightest exertion, and the extent of disease in the respiratory and circulatory systems, which always occur in the scurvy on board ships, are never met with in the land scurvy. In the latter we have sponginess of the gums, ulceration, which terminates in dysenteries and fevers, the first induced by a cachectic diathesis, but never involving that complete anemia of the blood, which amounts to a universal septic tendency." Is not this difference in the phenomena of the disease owing solely to the fact that on board of vessels at sea men are compelled to breathe a confined, vitiated, and impure air, while upon land this cause of deterioration of the blood is removed? It is much to be regretted that the internal arrangements, with the accommodations for officers and crew, on board many of even our large public vessels are so defective—the hold being small, badly arranged, and imperfectly ventilated, while the berth-deck is low, with very small air-ports, which are only opened in port, or at anchor, and in the best weather; while the apartments for the officers are small, dark, and contracted. The ventilation is imperfect below, because the hatches leading to the berth-deck are so arranged that wind-sails cannot pass in a perpendicular line from the spar-deck to the berth-deck or hold; while the sick-bay in the bows of the ship, on the berth-deck, and the cockpit, are without light and air, with a temperature sometimes of between 80 and 90° for weeks together, and no hatch for the admission of a wind-sail. When to these we add the low dismal ward-room, poorly lighted and ventilated; and the coldness and dampness in winter, incident to daily washing and wetting, the daily use of salt beef and pork, long preserved, and consequently innutritious; the daily *spirit-ration*, and personal uncleanness, we need not be surprised at the occasional appearance of scrofula, in its most malignant form, in the United States navy.]

20. B. The urine in scurvy is commonly of a dark reddish brown, and sometimes of an almost black colour. Although it is slightly acid as it is evacuated, it very soon becomes alkaline, and emits a strong and disagreeable ammoniacal odour. Blood is often discharged with the urine, and the urine then assumes a dark reddish-brown colour, in consequence of the presence of hæmatoglobulin; in this case it develops hydrosulphate of ammonia, and soon becomes putrid. Dr. SIMON examined the urine in three cases of scurvy in SCHÖNLEIN'S clinical wards—two men and one woman. The urine was very similar in these three cases in its physical characters. It was scanty, and of a deep dark-brown colour; after standing a few hours, it emitted a disagreeable ammoniacal odour. The three specimens resembled each other, and were found to approximate the chemical characters of the urine in typhus. The urea was less than in healthy urine, not exceeding 25-30ths of the solid residue. The fixed salts were diminished in the two male cases, being 14-18ths of the solid residue; but in the female they were 27, or a little above the normal average (25). The uric acid was slightly above the healthy standard in all, being from 1 to 3 of the solid residue.

21. iii. APPEARANCES ON DISSECTION.—Scurvy at the present day seldom proves fatal, unless in ships or in besieged towns, where opportunities of minutely examining the bodies after death are rarely enjoyed; and the observations of early writers on this subject are generally devoid of precision, and the necessary details. The best account of the appearances after death has been furnished by Dr. BUDD, from the cases which were brought to the *Dreadnought* Hospital Ship. He states, "The general inferences to be drawn from preceding facts are, that, in the inspection of the bodies of persons who die of scurvy, the chief indications of that disease are met with in the colour of the skin, in the state of the gums, and in the presence of fibrinous effusions, and of ecchymoses, or effusions of blood. These effusions occur most frequently in the skin, in the subcutaneous cellular tissue, and between the muscles of the lower extremities, between the periosteum and bones of the lower extremities and of the jaws; and in the peritoneal coat, and in the muscular and mucous coats of the intestinal canal. The numerous traces of hæmorrhage observed in the coats of the intestines are in accordance with the frequency with which scorbutic persons pass blood by stool."

22. The slight effusions of blood between the periosteum and bone do not destroy the muscular connexions between these parts, so that the latter does not generally present farther alteration. Beyond a paleness of tissue, there is no change characteristic of scurvy observable in the brain. The organs of respiration, the heart and large blood-vessels, the glandular system and the bones, presented no remarkable changes in the cases inspected by Dr. BUDD. His observations furnished him with no direct information respecting the blood, except that it is deficient in red particles; that it does not impart a stain to the lining membrane of the heart or vessels; and that it has not lost the property of coagulating. The change observed in the skin and in the complexion is to be ascribed to

the alteration of the blood, and the hæmorrhages doubtless proceed, at least in part, also from this alteration. Former writers have noticed more or less of a fluid or dissolved condition of the blood, and a soft, flabby state of the *heart*; this latter change accounting for the swooning and fatal deliquium sometimes occurring in the more extreme cases. The *liver* has been found pale, or of a pale buff colour, or of a nutmeg appearance; and the *bile* in the gall-bladder of a pale or yellowish colour. The *spleen* is generally soft, of a plum colour, and often more or less enlarged. The *lungs* are sometimes œdematous, especially in their more depending parts. The *kidneys* and urinary passages seldom present any change in the uncomplicated states of the disease.

23. According to the descriptions of POUPART, LIND, and others, the blood discharged from the mucous canals during life, as well as that found in the cavities of the heart and vessels after death, was remarkably altered, fluid, broken down, and presented more or less of a greenish-black hue. The spleen was generally much enlarged, and so soft as to break down on being handled. Adhesions often existed between the costal and pulmonic pleura, and sometimes dirty serous effusions were found in the pleural cavities. Black, corrupted blood was generally effused between the muscles, or infiltrated between their fasciculi, and under the skin and periosteum; and the auricles were remarkably distended by coagulated blood, in those who died suddenly. In young subjects the epiphyses were loosened from the shafts of the long bones, and the ribs had separated from their cartilages. In some the glands of the mesentery were more or less enlarged. The kidneys were occasionally altered. The alterations found in the bones, especially those now mentioned, most probably arose from the effusion of blood between the periosteum and osseous structure, and from the consequent destruction of the vessels of the former, which nourish the latter.

24. iv. COMPLICATIONS, &c.—Much of the diversity observed in the symptoms and progress of scurvy, as well as in the appearances after death, depends upon the nature of the food, or of the privations causing the malady, and upon antecedent, concurrent, or intercurrent disease; for, as will be shown in the sequel, although the privation of fresh vegetables and fruit is mainly productive of it, still much is owing to the food upon which the patient has been living up to the time of his attack and during its progress. The diseases which commonly precede and favour the appearance of scurvy are agues and remittent fevers, enlargement of the spleen or liver, rheumatism, dysentery, or chronic diarrhœa; and either of these may complicate, in a more or less evident manner, the scorbutic state, especially in its more chronic form, or may appear as an intercurrent malady. These complications are most apt to occur in warm or temperate climates, and wherever malaria is present; and probably the association with rheumatism is most common in colder regions and seasons. When they do appear, they are readily recognised when the physician is alive to the probability of their association, and when the causes on which they chiefly depend are observed to be in operation. The supervention

of scurvy upon ague, or upon enlargements of the spleen, or upon affections of the bowels, is not infrequent, especially in the winter and spring months, when fresh vegetables and fruits have become scarce, and when cold, humidity, and these diseases have predisposed the frame to this malady; and it was certainly much more common in former ages, before potatoes came into general use.

25. *The complication of scurvy with dysentery* was the most prevalent and fatal disease during the Burmese war, and was entirely owing to the nature of the food in connexion with malaria and bad water. But it is unnecessary to add, at this place, to what I have stated when treating of the *forms and complications of Dysentery* (see § 39, *et seq.*). Although *rheumatism* is undoubtedly in some cases, and at certain seasons, occasionally associated with scurvy, still the pains, which are most commonly attendant upon the latter, are rather to be imputed to the infiltrations of blood which take place between the muscular fasciculi and under the periosteum, than to any rheumatic complication. A moderate attention to the matter will be sufficient to distinguish the nature of the case, as well as the existence of enlargement of the spleen, and the connexion of the disease with ague.

26. Persons labouring under scurvy are very liable, when exposed to cold and humidity, to experience severe attacks of *pleurisy*, or of *pericarditis*, or of *peripneumonia*, or of *bronchitis*, which may carry off the patient in a short time, without materially influencing the symptoms of scurvy. In these cases, the dyspnœa, cough, and difficulty of expectorating become urgent; the expectoration, varying with the state of pectoral disease, from a slight mucous, frothy matter, to a dirty brown, or dark red, or sanious substance. Effusion into the pleural cavities, or effusion into the air-cells and small bronchi, and splenification of the substance of the lung, ultimately hasten or occasion a fatal issue. In rarer instances changes in the *kidneys*, which I have ascribed to cachectic inflammation of the secreting structure of these organs (see *art. KIDNEYS*, § 80, *et seq.*), supervene, and, by embarrassing the functions of these organs, superinduce dropsy upon the scorbutic disease, and thereby occasion or accelerate an unfavourable termination.

27. III. DIAGNOSIS.—Of the numerous writers who preceded LIND, very few pointed out with due accuracy the diagnostic characters of scurvy, or distinguished sufficiently between this disease and *malignant* or *putrid fevers*. In many circumstances, and on many occasions, some of which I have myself witnessed, it is difficult to determine as to the presence of scurvy or of putrid fever, at first sight, or until a more patient and close observation has shown the difference, so insensibly or gradually, in such circumstances, some of which I observed in Germany and France after the last war, does the one malady approach the characters of the other. In Ireland, in 1847, owing to the failure of the potato-crop, and general misery, scurvy was intimately associated with putro-adyamic fever, and it was most difficult to distinguish between them, or to say which was the primary malady. The same observations equally apply to *purpura*, which often arises from similar causes to those producing scurvy, and is more

or less closely allied to, although generally distinguished from, scurvy, the more extreme points of difference between the two having been laid hold of as diagnostic characters, while the closest resemblances have been kept out of view. It will be more just, more conducive, moreover, to accurate pathological views, and certainly tend more to the adoption of sound indications and means of cure, to look closely at diseases as they occur in practice, to consider both alliances and differences, and to proceed in our treatment on the comprehensive basis thereby furnished us.

28. Circumstances have occurred, and may occur again, in which certain of the causes of malignant fever, as a confined impure air, crowding of numbers into a small and ill-ventilated space, &c., have come into operation, in connexion with the causes of scurvy, especially a deficiency or want of fresh vegetables and fruit, and have given rise either to the petechial or putro-adyynamic form of fever, or to a state of febrile scurvy, or to a disease in which the symptoms of either the one or the other predominated, according as the causes of either prevailed. In attempting to distinguish between these diseases, or to determine the existence of either, the discriminating physician will be guided by the slow and gradual, or the rapid accession of the symptoms; by the states of the skin, of the gums, and of the teeth; of the general surface, and particularly of the lower extremities; by the discoloration and other changes there observed; by the presence or absence of complete prostration and of other febrile phenomena; by the acuteness or intensity and duration of the malady; by the appetite and function of digestion; by the inability or capability of leaving the bed; and by the presence or absence of contractions of the lower extremities, or of hardness, swelling, and livid patches or ulcers in these situations.

29. In distinguishing, also, between scurvy and *purpura*, the presence or absence of the majority of the above symptoms, and more especially the states of the gums and teeth, the swellings, indurations, livid blotches, œdema of, or the fungous ulcers on, the extremities; the contractions of the joints; and various associated phenomena, will guide the physician to a correct diagnosis, and while they indicate with due precision the existence of either the one or the other, will at the same time point out the close alliance between both as to their causes and their natures. (*See PURPURA*, § 23.)

30. IV. THE PROGNOSIS OF SCURVY.—Before the disease is advanced so far as to present contractions, indurated swellings, or fungous ulcers on the extremities; or hæmorrhages from mucous canals; or swoonings upon assuming the erect posture, or on slight exertion, a speedy recovery will generally follow the use of the means about to be recommended; but when the malady is thus far advanced, although the same means will often save the patient, they may also fail; and this unfavourable result is the more likely to ensue if, with these symptoms, the patient complains of dyspnoea, and oppression at the chest; if his respiration and pulse be very frequent; if there be any pulmonary, pleuritic, or dysenteric complication; if dropsical effusions or albuminous urine supervene; if the spleen be much enlarged; and if

hæmorrhages from the bowels be copious, then great danger may be apprehended, and with still greater reason, if the adoption of a suitable diet and remedies is not soon followed by any amendment.

31. In cases which present not the extreme symptoms characteristic of scurvy, and are nevertheless unamenable to the usual scorbutic remedies, some complication should be looked for and ascertained, as this most probably either retards or prevents the efficacy of such means, or the disease partakes, owing to the causes above noticed (§ 28), more or less of the characters of putro-adyynamic or petechial fever—possesses the intermediate form already mentioned (§ 27), and requires an appropriate method of treatment. I am persuaded that the instances of scurvy which have been adduced of the failure of these remedies have either been the severer, or pulmonic, pleuritic, pericardiac, dysenteric, or dropsical complications of the disorder, or those intermediate states of disease now alluded to.

32. V. CAUSES OF SCURVY.—The causes of scurvy were only partially known until a comparatively recent period; for the disease was often ascribed to one only of the causes, and that a predisposing cause; and even now, when the chief causes have been duly recognised, others which either predispose the frame to their operation, or concur with them, and aid or determine their effects, are too generally overlooked, and their influence in modifying the malady, or in delaying or preventing the beneficial operation of the means employed, is altogether neglected, or even unknown. It has been fully ascertained that several of the causes to which scurvy was formerly imputed are not really the exciting or efficient causes of this malady; but their influence as predisposing, concurring, or determining causes should not be denied, although they cannot take the highest rank in causation, or because they have been pushed from the position formerly assigned them, by others of much greater influence.

33. i. PREDISPOSING CAUSES.—Several of these causes were formerly believed to have had the chief share in the production of scurvy; but they are now more clearly proved to perform a less important part; but this part they fill in the causation not only of this malady, but also of dysentery, putro-adyynamic fever, *purpura*, and probably of other diseases.—A. Much importance was attached formerly to living on *salt provisions*; and as this disease most frequently and certainly appeared in ships provisioned with salt meats chiefly, so it was inferred that these were the causes of its occurrence. That salted meats are not more productive of scurvy than fresh meats, or at least not much more so, is shown by the prevalence of the malady, in the spring of 1720, in an army which KRAMER stated to have enjoyed an abundance of fresh meat at a low price; in the Russian armies, in 1736, which were similarly circumstanced; in the French prisoners, at the middle of last century, who had no salt provisions; and in the regiments at the Cape, in 1836, that enjoyed an abundance of fresh meat.

34. From these and other facts, it may be inferred that scurvy may appear even among those who have a sufficient supply of fresh meats, if there be a prolonged deficiency at the

same time of succulent vegetables and fruits. Nevertheless, the question remains, Are salted meats more favourable to the supervention of scurvy than fresh meats? I believe, after having paid some attention to the matter, that recently-salted or uninjured salt meats, if they have been of a good and healthy description, and quite fresh when salted, are not materially more productive of scurvy than fresh meats; but while the quality of the latter is generally manifest, that of the former is not always so evident. The salted provisions supplied to ships have frequently been long cured, even before they are received on board, and are so often of the most inferior and unwholesome character, as to account in great measure for the appearance of cachectic maladies in those who live upon them. It was notorious, during Queen Anne's wars, that, owing chiefly to collusion between the heads of the commissariat or others in power and the contractors, and even in more recent times, that the salted provisions supplied to the navy and army often consisted not only of long or imperfectly cured meats, but also of the flesh of animals which had died of disease; that horse-flesh was often placed in casks of beef; and that similar villainous acts were not confined to salted provisions, but extended also to the flour and biscuits supplied to these services, both of these having been adulterated, and the latter mouldy, and swarming in maggots and weevils. Owing to this cause, as shown by some medical writers of the day, a much greater number of human lives were lost from scurvy, scorbutic dysentery, and putro-adynamic fever—by diseases caused by the unwholesomeness of the provisions—than from all other diseases, and from naval and military actions, sieges, and other causes combined.*

35. Not only were both salted and farinaceous provisions frequently deleterious, but the supply also was insufficient to both army and navy, up to the mutiny at the Nore, the causes of which were generally misrepresented by those in power, and misunderstood or glazed over by historians. In times more recent, acts similar to the above have been perpetrated in more places than one. The returns made to the Medical Boards in India by the medical officers, and which are preserved at the India House, are full of complaints as to the unwholesome nature of the provisions supplied to the army in the Burmese war; even the rice having been either unripe or damaged. The remarkable prevalence of scorbutic dysentery, and low fever among the troops in that war, was ascribed chiefly to this cause; the mortality continuing great until more wholesome provisions were procured. But it was not only in the public services—in fleets, armies, and transport vessels—that these enormities were practiced; trading-vessels, emigrant ships, &c., were sometimes, and are occasionally up to the present day, supplied with the cheaper kinds of Irish provisions, which are frequently of a similar kind to that

above described; and to this circumstance in part, and to others about to be noticed, should be ascribed the scurvy and fever so frequently breaking out in ships after their provisions have been used sufficiently long to produce their effects. To the unwholesomeness and nature of the food, and to the state of the water, even independently of the want of fresh vegetables and fruit, the diversity of characters presented by scurvy and fever in ships, armies, prisons, &c., is in great measure to be imputed, as well as the want of success in treating these diseases by the more usual remedies, or by those more generally found efficacious under other circumstances—the same causes not merely predisposing to these forms of disease, but actually producing them, and giving them their distinctive features.*

36. Much of the mischief observed in those who had lived long on salt provisions was formerly, and still is by many imputed to the salt by which these are cured, or at least to the state of the provisions; and by others to the supposition that salted meats are not so nutritious as fresh. But when these provisions have been from the first wholesome and good, have been salted while quite fresh, and have not been afterward kept so long as to produce any sensible or unpleasant change, they may then be considered as having had no farther share in the production of scurvy, even although it should have appeared during the use of such provisions, than that they have constituted the chief or only food, to the neglect of other articles requisite to correct the effects of so exclusive a diet, such as fresh vegetables and fruits. On this subject Dr. BURN justly remarks, that "the circumstances showing that scurvy may prevail to a frightful extent among persons living solely on fresh meat; that persons who, from the nature of their occupations, are continually absorbing saline particles, are exempt from scurvy; that scurvy is not brought on by the use of sea-wa-

* [In the United States navy, the salt beef and pork, which constitute a great portion of the daily ration of the seamen, are very generally deteriorated by age, and often unwholesome and innutritious; and, as the navy is supplied with these articles by contract, they are generally long kept, and nearly spoiled before they are served out. The salt, moreover, which is used in curing them is frequently of an inferior quality. As Dr. FOLTZ has stated, when new beef and pork are delivered to the government in a sound and wholesome state, they are carefully stowed away until the old stock on hand is consumed, by which time the new has reached the same condition as that which was nearly in a state to be condemned, if served.

Dr. COALE (United States navy) states that "the best beef that could be procured" (on board the United States frigate Columbia, previous to the appearance of the scurvy), "had been salted so long that all characteristics as an article of food seemed to be lost, and its odour, when boiled, was scarce supportable. The biscuit was very dark, required generally a hammer to break it, and the fracture mostly resembled a vitreous lustre."—(*Am. Journ. Med. Sci.*, Jan., 1842.) The daily rations supplied to the United States seamen are as follows:

Bread, fourteen ounces; whiskey (*at option*), half a pint daily; and in addition, on *Sunday*, suet, quarter of a pound; beef, quarter of a pound; flour, half a pound. *Monday*, pork, one pound; beans, half a pint. *Tuesday*, cheese, two ounces; beef, one pound. *Wednesday*, pork, one pound; rice, half a pint. *Thursday*, suet, quarter of a pound; beef, one pound and a quarter; flour, half a pound. *Friday*, cheese, four ounces; butter, two ounces; rice, half a pint; molasses, half a pint. *Saturday*, pork, one pound; beans, half a pint; vinegar, half a pint. It would doubtless conduce very much to the health of our sailors if *potatoes* could enter somewhat largely into the dictaries of our vessels, and form part of the daily rations.]

* From a tolerably extensive field of observation in various parts of Europe and within the tropics, between the years 1815 and 1819 inclusive, I can state, that, of the various kinds of unwholesome cured meats, pork is perhaps the most injurious, especially when it has been imperfectly salted or too long kept; and, more particularly, if it have been coarsely fed, or diseased, or not cured immediately upon being killed: scorbutic and other forms of dysentery generally resulting.

ter, which may be drunk with impunity, even by scorbutic people; and that the disease may be prevented for any length of time in persons who subsist on salt provisions, and can be readily cured, even in those who continue the use of them, are sufficient to justify the conclusion that salt has no share whatever in producing it" (p. 65). To this statement I would merely add, that the salt conceals, and partly corrects, the sensibly noxious properties of previously tainted, diseased, or otherwise unwholesome meats; and hence meats of this description, when salted, are more readily, and perhaps less injuriously, partaken of, and, moreover, have not their injurious nature made so manifest, or even suspected, as if an attempt to use them in their fresh state were made.

37. *B.* Next to the state of *meat provisions*, that of *farinaceous food* supplied to ships, armies, &c., as predisposing to, or even as producing scurvy, may be noticed. In various countries in the East, where little or no animal provision is used, scurvy has nevertheless appeared, and has been ascribed, with sufficient reason, not so much to deficiency of the amount as to the unwholesome nature of the food, whether rice, Indian corn, &c., which often have been damaged, unripe, mouldy, or too long kept. The flour, biscuits, and other farinaceous articles, supplied by contract or otherwise to the public services, and to trading vessels, were formerly, on many occasions, similarly damaged and unwholesome, or became so after having been kept for some time, and contributed their share towards the production of scurvy, fevers, and even to visceral disease. That these articles of food have actually been productive of these maladies, was demonstrated by the occurrences in the Burmese war; native Indian regiments subsisting entirely on rice and other farinaceous articles, which in that war was more or less damaged and unwholesome, having been universally attacked with scurvy and scorbutic dysentery.

38. *C.* The *water*, also, with which ships of war and trading vessels were supplied for long voyages, having been kept in wooden casks, the use of iron tanks for this purpose being of recent date, the water became offensive and unwholesome, on many occasions so much so as to be nauseous, and to require the addition of spirits to prevent its more immediate ill effects. The effects of marsh water in causing bowel complaints and enlargements of the spleen and liver, are well known to many who have possessed powers of observation in connexion with the requisite opportunities. But I can say from personal observation, that water, long kept in wooden casks, however well these casks may have been charred, as they sometimes are on their insides, becomes even more deleterious to health, and much more offensive to the senses, than any water taken from marsh-grounds or land-tanks, much, however, depending upon the state of the water when filled into the casks. The greater attention now paid to the supply, state, and preservation of water in the public services, and in trading vessels, is one of the chief causes of the less frequent appearance of disease in them, and more especially of scurvy and allied maladies.

39. *D.* *Cold and humidity* have long been considered as very influential in favouring the occurrence of scurvy. That these causes are of

some importance, I can assert, although Dr. Budd strongly doubts their influence. But he has not viewed them in a proper light. He remarks, that "the merchant seamen who enter the port of London, affected with scurvy, come almost exclusively from Mauritius, India, Ceylon, or China; and have consequently been in no higher latitude than that of the Cape." But he overlooks the circumstance that those voyages are long, and that the men have been living long upon cured meats, without a due supply of fresh fruits and vegetables; while most other vessels arriving at the port of London have had short voyages, they coming from much nearer countries, and consequently a sufficient period for the development of scurvy in them has not elapsed. It is not, however, the cold and moisture depending upon climate, or even upon weather, that are so influential in favouring the development of scurvy, as the cold and humidity arising from daily, and even twice daily, washing and scrubbing the decks, formerly and even still so much in use, to the neglect of dry-scrubbing and cleansing. The evaporation from the wet decks during day and night, consequent upon frequent washings during fine and dry weather, and the wet and humidity of body-clothes, bed-clothes, and hammocks, produced by these washings, and during foul or stormy weather, are the forms of cold and humidity which, on ship-board, predispose to scurvy, and more directly produce the several forms of rheumatism, chiefly by suppressing the cutaneous functions, by reducing nervous power, and thereby causing the accumulation of those excrementitious matters, the retention of which occasions these maladies. All the most experienced writers on scurvy have remarked the suppression of the cutaneous functions previously to the appearance of, and during the progress of scurvy, and I have no doubt of the fact from my more limited observation.

40. *E.* *Impure air* has been considered by some writers as predisposing, more or less, to the appearance of scurvy. The testimony of LIND, TROTTER, and BLANE, most experienced physicians, is opposed to the opinion that it has any influence either in the production or on the course of this malady. That the influence is not very remarkable, may be admitted; but that this cause is not altogether without effect cannot be denied, especially in modifying or altogether changing the characters of the disease, when conjoined with those causes which more directly and commonly produce scurvy. It was observed in the American squadron, in 1846, that scurvy was most severe in vessels which were the worst ventilated.*

41. *F.* *Several other diseases* predispose the frame to the appearance of scurvy; and although the predisposing influence has been attributed to the debility produced by those diseases, yet I believe that it is not the debility

* [In every instance where scurvy has broken out on board any of our United States public vessels, as the *Kar-tian*, the *Potomac*, the *Palmouth*, &c., it could be traced directly to the unwholesome and indigestible character of the meats, beef and pork, owing to long keeping, and the inferior quality of the salt used in curing them. In connexion with this was long absence from land, the total want of fresh provisions, breathing a vitiated atmosphere from imperfect ventilation, bad water, or a diminished supply; and, in some cases, despondency and disappointment from being kept on board after the expiration of the period for which the crew had shipped.]

alone which predisposes, but more especially the nature of the malady. Agues, remittent fevers, enlargement of the spleen, and rheumatism, and previous disorder of the digestive organs, especially the former, have been generally considered by medical writers as more or less influential in the production of scurvy. The previously impaired assimilation and nutrition, and the consequent state of the blood, in connexion with exhausted organic nervous energy, readily account for the readiness with which scurvy supervenes upon those maladies when its causes are in operation.

42. *G. The state of the mind* is influential both in predisposing to and warding off scurvy; the depressing passions favouring the appearance, and the exciting emotions preventing or delaying the occurrence of the malady. Disappointed expectations; anxiety; hope deferred; longings to return to more desired scenes; prolonged confinement; a want of exciting, amusing, and exhilarating occupations; breathing the same kind of air in the same locality; a monotonous and unexciting course of existence; losses of relations and friends, and extinction of those hopes or expectations which render privations endurable—all have their influence in predisposing the body to scurvy or its allied states of cachexy.

43. *H. The seasons* have no small influence on the appearance of scurvy, but mainly in consequence of the privation of fresh vegetables and fruits, which is experienced chiefly during winter and spring; so that in armies, as well as in fleets in, or departing from, cold or temperate countries, a deficient supply of those dietetic means of prevention is more likely to be experienced at those seasons than at any other. Suppressed perspiration, produced by the cold and humidity of these seasons, may also not be altogether unimportant, as shown above (§ 39), in favouring the evolution of this malady. In northern countries, where the inhabitants, the seamen, and the soldiers, live chiefly upon cured meat provisions, as salted and smoked meats, and dried fish, during winter and spring, and until the commencement of summer, when vegetables and fruits begin to appear, their constitutions have made considerable progress to the scorbutic diathesis; so that, when these preventive articles of diet cannot be obtained at this latter season, owing either to states of siege, and to the provisioning and other circumstances of armies or fleets, scurvy is then much more apt to break out in spring, and even in summer, than at other seasons.

44. *I. The early writers on scurvy* were inclined to ascribe a *contagious influence* to this disease, chiefly from the number attacked with it in the same place and circumstances; but it was clearly shown that contagion had no share in producing it, by LIND and others, who wrote about the middle and end of the last century, the causes inducing the malady being common to all affected by it in the same locality. But, although the disease is actually uncontagious, it is by no means unreasonable to infer that the putrid emanations from a number of persons in an advanced stage of the disease, confined often in very limited spaces, either on board of ships, in the crowded hospitals of a besieged town, or in crowded prisons, are not altogether innocuous, or are not without some influence

in predisposing the body to this or some allied malady, arising from the contamination of the circulating fluids, and from the depression of vital or organic nervous power, by the accumulation of these emanations in the air which is respired for a longer or shorter time. Nor would it be improbable that the emanations arising from a number of scorbutic patients, in places insufficiently ventilated, may convert the scorbutic malady into putrid, maculated, or putro-dynamic fever, or into scorbutic dysentery, or even may more directly develop these diseases.

45. *K. Age and Sex* have probably but little influence on the production of scurvy, for it is observed at all ages, and in both sexes; but there is no doubt that it occurs much more frequently in adults, or from early puberty until far advanced age, than in children, and in males than in females, chiefly in consequence of the greater exposure of adult males to the causes, owing to the circumstances in which they are liable to be placed.

46. *ii. THE EXCITING CAUSES OF SCURVY* may be briefly stated to be the use, for a longer or shorter period, of all kinds of animal meats, too long or imperfectly cured or preserved; of dried, or smoked, or tainted meats or fish; or mouldy, old, damaged, diseased, or unripe farinaceous articles of food, to the exclusion of, or without possessing the advantages of, fresh or succulent vegetables and fruits, or of other preventive articles of diet, or of medicine; more especially when the use of the former kinds of food, and the want of the latter, are aided by one or more of the predisposing or concurring causes already considered. That the want or neglect of those vegetable productions which have been found so beneficial, both in preventing and in curing scurvy, has a greater influence in the production of the malady, than even the prolonged use of the several kinds of animal food, however cured or preserved, has been proved on various occasions. But it cannot be denied that damaged, tainted, or too-long-cured substances—pork, the viscera and blood of the animals generally used for food—the flesh of animals which have died of disease, &c., are much more likely to occasion scurvy, and its various complications, than fresh and wholesome meats; although even these last may be followed by the disease, when too long or exclusively used, and when fresh vegetables and fruits cannot be obtained.

47. Although I cannot admit that scurvy is to be ascribed entirely and always to the absence or want of fresh succulent vegetables and fruits, as articles of diet, as contended for by Dr. BURN, yet I will not deny that such a privation is the most common and exciting cause of the malady, especially when no suitable means are employed—none of the numerous preventives about to be noticed (§ 54, *et seq.*) is had recourse to, in order to supply the deficiency, or to counteract the effects resulting from the nature or state of the aliments. In this, as well as in other diseases, we cannot with propriety ascribe the sole agency to one cause; generally more than one, frequently several, although of diversified amount of power, are concerned in developing the result, whether that result be simple, definite, or specific, or whether it be complicated more or less, or contingently associated.

48. *iii. The chief causes insisted on by writers*

on this disease were often approaches only to the truth, but these approaches were sometimes so near as to lead to judicious means of prevention and cure, although certain subordinate agencies were often overlooked. ECHRIUS, one of the earliest writers on scurvy, assigns as causes, "gross, unwholesome food of salt, dried, or semi-putrid flesh and fish, pork, spoiled bread, stinking water," &c. RONSSSEUS ascribed the frequency of scurvy in Holland to the diet and air, to eating quantities of water-fowl, but chiefly to living on flesh first salted, then smoked and dried, and to the season and weather. WIERUS, who probably viewed cases of psoriasis as modifications of scurvy, and in this agreed with many who both preceded and followed him, more justly remarked the not infrequent connexion of scurvy with ague and malignant forms of fever; and, with sufficient reason, ascribes this distemper "to unwholesome air, and chiefly to such bad or corrupt food as was used in northern countries, and by their shipping, viz., stinking pork, smoked rancid bacon, mouldy bread, thick, feculent ale, bad water, melancholy and grief of mind, preceding fevers, the stoppage of usual evacuations," &c. DORONÆUS imputed the scurvy in Brabant, in 1556, to the use of corrupted rye during a season of scarcity. ROSTOCK, in a treatise published in 1589, remarks, that impure water and bad air aid unwholesome food in producing scurvy, and states that the disease is endemic in several northern countries, and that scorbutic mothers often there bear scorbutic children, and often miscarry, or bring forth dead fetuses. BRUNNER insists upon the influence of damp, marshy localities, and other sources of malaria, in producing scurvy, and ascribes more to the nature of the bread used by the inhabitants of those localities than previous writers. HORSEIUS likewise insists upon the influence of malaria, and the use of new ale, without hops or any other bitter, in causing scurvy in various places in the north of Germany. VANDER MYE notices, more particularly than any previous writer, the influence of the emotions and passions of the mind in causing and in preventing scurvy, and adduces the effects of occurrences which took place during the siege of Breda in support of his views. In this siege he attributed the disease chiefly to the general use of old, spoiled, or musty rye, and to humidity; but other causes, both physical and moral, were also in operation. He adds, that "the distemper proved most fatal to the English soldiers, as they very early began to feed on dog's flesh, were in want of their beloved tobacco, and lay in the most wet or damp barracks. It was much less frequent among the Walloons and Flemings, they being more careful and delicate in their diet, and having much wholesomer quarters. Among the French it was more rarely met with, owing to their being stationed in the driest part of the town, and to their more sprightly dispositions."

49. J. HARTMANN takes notice of the influence of mercury, and of mercurial courses, in predisposing to scurvy. In 1645, the medical faculty of Copenhagen published a consultation on the causes, prevention, and cure of the distemper, for the benefit of the poor of the country; and in this meritorious production, the influence of cold, humidity, malaria, and of unwholesome water and beverages, is insisted upon, as aid-

ing the effects produced by food such as that already mentioned. MARTIN LISTER, and many of preceding and contemporary writers, and subsequently COCKBURN, PITCAIRN, BOERHAAVE, and others down to the appearance of BACHSTROM'S work, in 1734, agree in ascribing scurvy to the use of unwholesome food and water, or to those causes chiefly which had been mentioned by their predecessors. But the last-named author was the first to demonstrate that, however much the food and water used were concerned in occasioning scurvy, *abstinence from recent vegetables was the chief cause of the malady, and the use of these the chief prevention and cure.* Notwithstanding this very decided opinion, and the very conclusive evidence BACHSTROM furnished of its truth, the disease has been imputed by writers, down almost to the present day, rather to the prolonged use of cured provisions, than to the want of fresh vegetables and fruit. But it is unnecessary to pursue this part of the subject any farther.

50. DR. LIND states that scurvy most commonly occurred on land in persons who subsisted chiefly on dried, or smoked, or salted flesh or fish, and the unfermented farines; or upon bread made of peas, or a composition of peas and oatmeal. KRAMER states that, in his time, this distemper appeared most frequently among those who lived altogether on boiled pulses, without any green vegetables or summer fruits. The occurrence of the disease among the Russian troops, whose chief food was rye bread and meal, has been already noticed. Scurvy appeared among the inmates of a lunatic asylum in India, whose food consisted chiefly of rice and split peas; and Mr. MACCOLMSON mentions the occurrence of the distemper in the same country among prisoners kept on bread and water. That various kinds of bread, especially when long kept, will occasion scurvy, or at least not prevent it, I believe, when they are not accompanied with succulent vegetables or fruits. But something is also owing to insufficiency, as well as sameness of diet, to living in a state of confinement, to breathing the air of the same place or habitation, and to the duration of this state of confinement; for it has always been remarked that, when this latter cause has been concerned in producing the disease, the first cases have been those longest confined. It may also be noticed that the influence of farinaceous food in occasioning scurvy is great in proportion to the length of time the articles have been kept previously, or subsequent to their usual modes of preparation, and to their healthy, or ripe, or untainted condition when prepared. And it should be recollected that flour, if sound and fresh, is more likely to prove beneficial when baked or otherwise prepared, shortly before it is used, than when it has been made into bread or biscuits a long time previously.

51. The prevalence of scurvy during 1847 and 1848, in Ireland, Scotland, and some parts of England, was very generally ascribed to the failure of the potato crop. But in some places in Scotland, Dr. CHRISTISON imputed the disease to the privation of milk—an opinion which has been negatived by numerous observations of the prevalence of scurvy where the supply of milk was abundant.*

* [In the Perth general prison where scurvy was very

52. VI. THE NATURE OF SCURVY may be inferred with tolerable accuracy, especially as respects every practical purpose, from what has been adduced. But it is obvious that the numerous occurrences of the distemper, both on land and at sea, as described at least by the majority of the writers referred to in the *Bibliography*, were associated with the appearance of one or more of those maladies, of which I have pointed out the relations with scurvy (§ 27, *et seq.*); and that, with many cases of scurvy, both simple and complicated, others of a different nature, as psoriasis, and various chronic eruptions, also appeared. To these circumstances—to the extended signification thus imparted to the name, as well as to the complications it actually manifested—are to be ascribed the diversity of description, and the numerous and complicated subdivisions of the malady, contained in works upon it during the 17th and 18th centuries. Opinions as to the nature or proximate cause of scurvy were no less diversified, and even numerous. Without attempting to adduce these opinions in full, or to connect them with their authors, it may be briefly remarked, that they generally agreed with the pathological doctrines of the day in which they respectively appeared, and were assigned by their authors, without any satisfactory proofs—were mere suppositions, or, at best, inferences from loosely-observed phenomena. While some writers imputed scurvy to an acid state of the blood, others ascribed it to an alkaline condition of this fluid, and some even, to make more sure of the fact, considered that acidity in certain cases, and alkalinity in others, were its actual causes, the predominance of either condition giving rise to the different forms of the malady. These views not proving satisfactory, especially to those who had opinions of their own to propose, the existence of a predominant saline condition of the blood was supposed and accredited by many. But the particular salt was never shown, some considering it to be an acrid salt, others a rancid salt, and so on. Then came a viscid state of the blood to be asserted, then a vitiated as well as a viscid condi-

tion, and even the existence of a putrid ferment in the blood to be inferred. More recent writers considered that a simple dyscrasis of the blood only existed; others, not content with the simplicity of this view, thought it necessary to impart to it some special property or chemical quality, and contended that the dyscrasy was acid; and some were positive as to the dyscrasy being alkaline. Lastly, we find the distemper referred to the existence of a dyscrasis produced by the evolution of an acid ferment in the blood; the chief reason for the existence of this ferment being that an alkaline ferment could not exist; but the particular acid was not shown.

53. The chemical pathologists of the present day have not thrown much more light upon this part of the subject than their predecessors, each of whom considered his opinion as good as the former believed their own to have been. Dr. CHRISTISON supposes that scurvy arises from the want of vegetable albumen or animal casein in the food; and Dr. GARROD believes that the malady is caused by the absence of potash, and that potatoes and other antiscorbutics owe their virtues to the potash they contain. Dr. ALDRIDGE contends for the influence which should be ascribed to a deficiency of phosphorus, sulphur, lime, and the alkalies, in occasioning scurvy. That something may be owing—a part merely—to the causes contended for by Dr. ALDRIDGE, is not improbable. But it is unnecessary to pursue this subject any farther than very briefly to state that one of the most evident changes from the healthy condition is seated in the blood; but that this change is probably not the earliest in the proceession of morbid phenomena, as it most certainly is not the only or the most advanced. That the change of the blood is manifested by the sensible or physical properties, as well as by the chemical constitution of this fluid, will readily be admitted; and that, in consequence of this change, the several solids of the body are more or less affected, will also be conceded; but I contend that these are not the only alterations; for the vital qualities of the blood itself are more or less altered, or rather impaired—those vital qualities which the blood derives from the organic nervous system, through the medium chiefly of the vessels in which it circulates. That the organic nervous system is early affected, either primarily, or through the medium of the blood, or in both modes, is shown, not merely by the functions, but also by the vital cohesion and organization, of the viscera and tissues which this system supplies and vitally actuates. But it is immaterial whether this system or the blood be the part primarily affected; for there can be no doubt that morbid states of the chyle, occasioned either by the nature and quality of the aliments, or by the defect of certain elements consequent upon the want of the requisite vegetable productions, or by both causes conjoined, will affect the assimilating functions, both by impairing organic nervous power and by altering the constitution of the blood, the slow and gradual progress of these changes giving rise to all the structural as well as functional alterations characterizing the advanced stages of the malady.

54. VII. THE PREVENTION OF SCURVY.—A. The efficacy of *limes, lemons, shaddocks, oranges,*

prevalent, Dr. CHRISTISON states that the prisoners were constantly employed; that they were not exposed to damp; that the ventilation of the cells was tolerably good; that the victuals of all kinds were excellent in quality; that there were *no salt provisions*; that fresh succulent vegetables, though not abundant, were not wanting; that *milk* has recently been withdrawn, and *treacle* substituted in its place. Hence he concludes that the sole cause of the disease was the absence of milk; for he states that the restoration of the milk arrested the spread of the disease. But *meat* was also given three times a week, which no doubt contributed to check the disease. That the absence of milk alone will not cause scurvy, is demonstrated in all our penitentiaries, almshouses, jails, &c., in which milk is rarely, if ever, used, and yet the disease is almost unknown. The want of potatoes, meat, and milk in the Perth prison, with imperfect ventilation, was amply sufficient to produce the disease. So we have observed the disease, in former years, to prevail pretty generally among the New York pauper children, confined in crowded apartments at the Long Island Farms, and kept on too innutritious food, scanty in quantity, and miserable in quality, which disappeared on supplying them with meat, and a more generous diet. *Any diet whatever*, which will deteriorate the blood, lessening the globuline and its plastic qualities, will produce scurvy; and where persons subjected to such diet breathe an atmosphere deficient in oxygen, the blood becomes still more rapidly vitiated, and the disease assumes a more severe and insidious form. The Indians of our western prairies live for weeks on the flesh of the buffalo, without fresh vegetables, and yet we never hear of their being attacked with scurvy.]

and *pomegranates*, in preventing scurvy, was known to several of the earlier writers on the disease, one of whom is quoted by LIND, in proof of the use thus made of these fruits by the Dutch seamen. ROUSSEUS, ALBERTUS, and other writers in the 16th century, make particular mention of lemons and oranges for the prevention and cure of scurvy. Although particular and convincing proofs of the efficacy of these were thus early furnished, not only by the Dutch, but also by some of our own early navigators, and subsequently by Admiral WAGER, and others, insufficient attention was paid to the use of these fruits until the appearance of Dr. LIND's celebrated work on scurvy, at the middle of the last century. Notwithstanding the evidence so conclusively adduced by this able writer, these means of preventing scurvy were nevertheless more or less neglected, or were left to the caprice or choice of commanders and others, until the efforts of BLANE, BLAIR, and TROTTER, towards the end of that century, succeeded in procuring the adoption of lime-juice for the naval service. The lemon and lime juice now supplied to the navy is preserved by the addition of one part of strong brandy to ten of the juice. But when the fruit can be procured, it is generally preferred, and is used, especially when it is actually required, with much pleasure and relish.

55. *B. Other fruits*, particularly those of an acid nature, and even the *sweet fruits* before they are ripe, are more or less efficacious in the prevention and cure of scurvy. Dr. TROTTER states that, having remarked that scorbutic slaves threw away ripe *guavas*, while they used the green fruit, he resolved to try the effects of such. He selected nine negroes, equally affected with scurvy. To three of those he gave limes, to three green guavas, and to three ripe guavas. They were served by himself; and, at the end of a week, those who were restricted to the ripe fruit were nearly as before the experiment, while the others were almost well. M. FODÉRE states that the good effects of *unripe grapes* were very apparent in the scorbutic cases of the French army of the Alps, in 1795. Sir J. PRINGLE recommended *apples* as a preventive in 1776; and Dr. TROTTER remarks that, "when Lord BRIDPORT's fleet arrived at Spithead, in September, 1795, almost every man in the fleet was more or less affected with scurvy. Large supplies of vegetables were provided; and lemon-juice being scarce, in consequence of the previous great consumption, fifty baskets of unripe apples were procured for the use of the fleet. The *Royal Sovereign*, in particular, derived great benefit from them;" and the cure of the disease was every where most speedy. *Tamarinds*, and most of the acidulous fruits of warm and hot climates, are more or less antiscorbutic. When scurvy was prevalent among the troops at Rangoon, during the Burmese war of 1824, the *Phyllanthus emblica*, or anola, which has a rich, acid taste, was employed as an antiscorbutic with much benefit.

56. When BACHSTROM asserted, in 1734, that scurvy was the result of a more or less protracted privation of fresh vegetables and fruits, he stated at the same time both its prevention and its cure; and, although certain vegetables and fruits accomplished these purposes more quickly and fully than others, all those which

are edible possess more or less of these beneficial properties. The writers of the 16th century have generally noticed the popular use of *scurvy-grass*, *brook-lime*, *water-cresses*, &c., for the prevention and cure of this distemper. All succulent vegetables and plants comprised in the order *Crucifera* are more or less efficacious, especially the *radish*, *horseradish*, *turnip*, *carrot*, *cabbage*, &c.; and even such of these as are commonly only used when boiled are most efficacious when taken raw and fresh from the ground. Dr. LIND very justly insists upon this circumstance, and remarks that herbs in form of salads are more efficacious than when boiled; and that their antiscorbutic properties are destroyed by drying, as shown by KRAMER, and by the results observed from the antiscorbutic herbs sent from Vienna to the army in Hungary. *Onions*, *garlic*, *leeks*, and *potatoes* are all very decidedly antiscorbutic, and as these may be preserved for some time, they are most beneficial for the provisioning of ships or armies. The very general use of potatoes in modern times partly accounts for the remarkably less prevalence of scurvy at the present day than formerly.

57. Most of the articles which are antiscorbutic may be preserved by *pickling*, especially by the pyroligneous acid or vinegar, and retain in a great degree their virtues. The immunity of Dutch vessels from scurvy has been ascribed by Dr. KERR and others to the use of *sour kroute*; and the health of the crew of the *Centurion*, during Captain COOK's voyage, was considered to have been owing to a liberal supply of this antiscorbutic.* The quantity usually allowed of this substance was two pounds' weight to each man per week, besides a pound and a half, or two pounds, with every gallon of peas, for making soup.

58. There is no northern country where scurvy is generally endemic during winter, spring, and the early part of summer, that does not furnish a supply of antiscorbutics, if duly recognized and preserved for these seasons. In Norway, Greenland, Iceland, and Lapland, they employ *scurvy-grass*, *sorrel*, and various other warm and acid herbs. Sir E. PARRY, in his first polar expedition, experienced the advantage of sorrel in the cases which occurred among his crews. He states that sorrel was preferred by the Esquimaux to scurvy-grass. He adopted, also, the advice of BACHSTROM and LIND, and raised small quantities of *mustard* and *cress* in his cabin, in small, shallow boxes, filled with mould, and placed along the stove-pipe; and as much of these were thus produced, although etioloated from want of light, as to prove beneficial to the scorbutic cases.

59. *C.* There is, perhaps, not any vegetable production more remarkably antiscorbutic than the tribe of *firs*, especially the spruce-fir and

* Dr. KERR, in his able treatise on scurvy, remarks, that "Sour kroute or croute (*sauer-kraut*, Germ.) is prepared by slicing the soundest and most solid cabbages in the way cucumbers are used in this country. In this state they are put into a barrel in layers, hand high, and over each is strewed a handful of salt and caraway seeds: in this manner it is rammed down, stratum supra stratum, till the barrel is full, when a cover is put over it, and it is pressed down with a heavy weight. After standing for some time in this state, it begins to ferment; and it is not until the fermentation has entirely subsided that the head is fitted to it, and the barrel is finally shut up and prepared for use."—*Cyclop. of Pract. Med.*, vol. iii., p. 691.

common fir, and mountain pine. MOELLENBROEK states, that when the Swedish army, at war with the Muscovites, were attacked with scurvy, Dr. ERBENIUS prescribed a *decoction of fir-tops*, by which the most deplorable cases were cured, and the rest of the troops protected from the distemper. Two squadrons of ships fitted out by Russia in 1736, were obliged to winter in Siberia, and their crews became affected with scurvy. After attempts to discover a remedy, the pines which grew plentifully on the adjoining mountains were hit upon; and by these all the men recovered in a few days.—(GMELIN, *Flor. Siber.*, p. 181.) Dr. LIND remarks, that pines and firs, as well as the shrub called the black spruce, have all analogous medicinal virtues, and great efficacy in the prevention and cure of this disease. "A simple decoction of the tops, cones, leaves, or even green bark and wood of these trees, is an excellent antiscorbutic; but it becomes much more so when fermented, as in making spruce-beer, where the molasses contributes, by its diaphoretic quality, to make it a more suitable medicine. By carrying a few bags of spruce to sea, this wholesome drink may be prepared at any time. But when it cannot be had, the common fir-tops should be first boiled in water, and the decoction afterward fermented with molasses, in the common method of making spruce-beer, to which a small quantity of wormwood and horseradish root (which it is easy to preserve fresh at sea) may be added."

60. *Tar-water* was formerly strongly recommended as an antiscorbutic; but the extravagant praises bestowed upon it at the commencement of the last century greatly injured its just reputation. Dr. LIND still continued to uphold it; and many years ago, I had occasion to have recourse to it as a preventive, when placed in circumstances most likely to occasion this distemper, and when no other means could be obtained.* There are many reasons to believe that all the *terebinthinates* are antiscorbutic; and that, when the disease is attended by hæmorrhage, there is no substance so efficacious as the spirit of turpentine, when taken in small and repeated doses, in arresting the hæmorrhage, in restoring the tone of the extreme vessels, and removing the contractions of the joints. With this impression, I recommended Sir E. PARRY to have a supply of this medicine in his last polar expedition; and he adopted the recommendation. The *anuda-tree*, to which CAR-

TIER attributed the remarkably quick recovery of his crew, is considered by LIND to have been the leaves and tops of the American spruce; and it, as well as the other pines and firs, evidently owed much of its virtues to the terebinthinate principles it contained.

61. *D. Molasses* has been considered by LIND and others as antiscorbutic; and Sir G. BLANE states, that the ship in which it was first tried was the only one in the squadron that was free from scurvy, which prevailed so much in the other ships, that, on their return to Portsmouth in August, 1780, 2400 men were sent to the hospital with this disease. Subsequently, molasses was served with rice to the men who were scorbutic, or threatened with scurvy, in Lord Howe's fleet; and the benefit derived from it was so great that it was made for some time a regular article in the victualling of ships. Nevertheless, the malady was not entirely prevented; and in some vessels well supplied with it, scurvy prevailed to a great extent. Dr. BURN believes that the antiscorbutic properties of sugar-cane are greater than those of molasses, and that they are much impaired by the process employed in the manufacture of sugar. I consider this opinion to be correct, from what I have observed in warm climates.

62. An anonymous work on scurvy, published in 1767, recommended the use of *wort*, or an infusion of malt, as an antiscorbutic; and this substance was afterward favourably noticed by Dr. BADENOCH. Captain Cook employed it in the *Centurion*, and spoke highly of its efficacy. He took with him a large supply of malt, with which to make wort; of this from one to three pints were given daily to each man. Sir G. BLANE states that the fleet in the West Indies was supplied with the *essence of malt*; that it proved of service, but that its antiscorbutic properties were inconsiderable. The process of extracting the essence very probably impaired the properties possessed by the infusion.

63. *E. Various fermented liquors* have been used as antiscorbutics, some of them from times immemorial, in northern countries. In Norway, in the Færøe and Shetland Isles, the inhabitants have, from the earliest ages, used, as their common beverages or drink, two kinds of fermented liquors; the one consisting of the fermented serum of butter-milk, or of fermented butter-milk, the caseous matter being removed as the fermentation proceeds; the other being an infusion of the bran or husks of oats and barley, that is fermented after the chief part of the farinaceous deposit from the infusion is removed. This deposit takes place from the infusion after this latter is poured off, or otherwise separated from the bran or husks. The infusion is then allowed to ferment, and the farinaceous deposit is removed, and used as an article of diet. These are very agreeable beverages, especially during the advanced stages of their fermentation, and constitute the common drink of the inhabitants. They are the chief means of averting scurvy in these parts, where fresh vegetables are either scarce, or not to be obtained, during a great part of the year, and where fruits are almost altogether wanting.

64. In all the continental countries bordering on the Baltic, and Northern and German Oceans, *spruce-beer* is the most generally and most efficaciously used as a preventive of scur-

* The author of this work, in the winter of 1817 and 1818, was a passenger to England in a vessel which was detained by bad weather at sea during thirteen weeks and four days, and which was provisioned and watered for seven or eight weeks only. He fortunately had laid in a small stock of articles for his own use; but, nevertheless, it was found necessary, after some time, to place every one on an abridged allowance of food and water. The meat provisions were altogether long salted, and were chiefly pork; the biscuit was coarse and mouldy. The water ultimately, also, was short in quantity, turbid, bluish, and most offensive. There fortunately was a very moderate supply of potatoes. During thirteen weeks no land had been seen, nor any other vessel communicated with. In this predicament—which, however, was not the only or the most dangerous one—the author caused a small quantity of tar to be put into the water before it was used for drinking, and a little spirit was added. To these means, aided by a very moderate supply of potatoes, he attributed the preservation of the crew from scurvy and scorbutic dysentery, every person arriving in the Downs in good health, notwithstanding the unwholesome supply of food and water, and the unfavourable season.

vy; vessels from Denmark, Sweden, Holland, Riga, Dantzic, &c., being generally provided either with it or with the essence of spruce, for their antiscorbutic properties. Spruce-beer is beneficial, not only for the prevention and cure of scurvy, but also in the treatment of most fevers of a low type, and of several cachectic diseases; in all of which I have, since the commencement of my practice, frequently prescribed it. 'As shown above (§ 59), it may be readily prepared from the materials which are easily procured, and as easily carried about. *Cider* and *perry* are among the most decided antiscorbutic beverages in use in this country, and were long ago shown to be very serviceable by Sir J. PRINGLE and Dr. LIND. *Small-beer*, in a state of brisk fermentation, is also antiscorbutic, especially when a sufficient quantity of hops, or of a vegetable bitter, has been added. Sir G. BLANE and others have made a favourable mention of *malt liquors*, and I have seen them used with advantage, especially *porter*, when bottled and well preserved.

65. The several kinds of *wine* are more or less antiscorbutic; and they are rendered still more so by the addition of vegetable bitters and aromatics, more particularly absinthium, calumba, cascarilla, ginger, orange and lemon peel, &c. It has been observed that scurvy was rare in French ships of war in which the wines of their country were served out to the crews. Sir G. BLANE, Dr. LIND, and Dr. BRYSON, agree in reprobating the use of spirituous liquors. There can be no doubt of the injurious tendency of these when taken in excess, or habitually, or undiluted; but used in small quantity, largely diluted, and added to the more common antiscorbutic beverages, or to bitter vegetable infusions, they are decidedly beneficial, both in the prevention and cure of the distemper. There are various contingencies which occur to voyagers, requiring a cautious and moderate recourse to one or other of these liquors; and, in circumstances threatening the outbreak of scurvy, the addition of a small quantity of either of them to the means of prevention in common use has a very beneficial influence upon the spirits and constitution of those who thus abstemiously use them, and promotes the good effects of the more efficacious antiscorbutics, especially during exposures to cold and humidity.

66. *Vinegar* was early employed as an antiscorbutic, and our fleets were generally supplied with it during the last century. Dr. LIND, Sir G. BLANE, Dr. TROTTER, and others, have shown that the distemper prevailed in ships which were well supplied with this article. Much, however, depends upon the kind of vinegar employed. The pyroligneous acetic acid certainly possesses considerable antiscorbutic properties, much apparently depending upon the source and the preparation of this article. Dr. BURN remarks, that he has observed scurvy in ships well supplied with vinegar; but the disease, in its most aggravated form, has appeared among those crews which had no regular allowance of this article.

[The expressed juice of the *Agave Americana* (*American aloe*, or *magney*, as it is termed in Mexico) has lately been used with great success in the American army in Texas for scorbutus. Dr. PERIN, U. S. A., reports several cases cured very promptly by the *magney*, which go

to show it to be greatly superior to most other remedies in this disease. The leaves are cut off close to the root, placed in hot ashes until thoroughly cooked, when they are removed, and the juice expressed from them. The expressed juice is then strained, and given in doses of from ʒij. to ʒiij., three times a day. It is not disagreeable to take, and sits well on the stomach. After the leaves have been cooked, the cortical portion near the root may be removed, and the white internal portion may be eaten. It appears to be a wholesome and nutritious food.—(*New York Jour. Med.*, Sept., 1851.)

The *wild pepper-grass* (*Lepidium Virginicum*) was found very useful in the treatment of scurvy in Florida during the Seminole war. The *wild onion* (*Allium angulosum*), a small bulbous plant growing on the Upper Missouri and the Western prairies, has also proved very beneficial in arresting the disease.]

67. *F.* The *mineral acids* have been found but little influential in the prevention and cure of scurvy. Dr. LIND took twelve patients on board of the *Salisbury* at sea; their cases were quite similar. They lay in one place, and the diet was the same for all of them. Two of them were ordered a quart of *cider* daily; two others took twenty-five drops of *elixir of vitriol* three times a day; two had two spoonfuls of *vinegar* thrice a day, and their food well acidulated with it; two were put on a course of *sea-water*, about half a pint having been given every day; two had each two *oranges* and one *lemon* daily; and two had the size of a nutmeg, three times a day, of an *electuary* made of *garlic*, *mustard-seed*, *rad. raphan.*, *balsam of Peru*, and *myrrh*; using barley-water, acidulated with *tamarinds*, for drink. The oranges and lemons were the most speedily beneficial; next to those the *cider*: those who took the other medicines were, at the end of a fortnight, much in the same state as those who had taken only lenitive electuary and cream of tartar as an aperient.

68. *G.* There are numerous medicines besides those already mentioned which are more or less useful in preventing as well as in curing scurvy. Most of the more *succulent* and *acidulous* vegetables, plants, and fruits, especially when fresh, or preserved by pyroligneous vinegar, are beneficial; but many of them lose their antiscorbutic virtues when dried, and others when boiled. Of the medicines which may be used, and which are certainly occasionally serviceable, even when other means have failed, I may mention the *chlorate of potash*, *nitrate of potash*, *camphor*, the *chlorides*, *lime-water* and the *chloride of lime*, *chlorine*, *chlorinated water* and *chlorinated soda*, *sarsaparilla*, *serpentaria*, *sassafras*, *capsicum*, *taraxacum*, *guaiaecum*, *mezeoreon*, *senega*, *elm-bark*, *dulseanara*, the several *balsams*, &c.; but these are severally only of use for certain modifications and complications of the malady.

69. It has been frequently supposed, and the supposition too often acted upon, that *fresh meat* is of itself sufficient to prevent or to cure scurvy when it breaks out in ships, and this opinion may supersede the opportunity of procuring fresh vegetables and fruits. Dr. BURN states, that, during the year in which he wrote on this disease, "the captain of a vessel trading to the Mauritius furnished his men, while they stayed

at the island, with a plentiful supply of fresh beef, procured at considerable expense, but neglected to provide them with vegetables and limes, which abound in the island. The consequence was, that scurvy broke out soon after they set sail, and before the ship arrived in this country one half the men before the mast had died of it, and the rest were disabled" (p. 77).

70. *H.* It is not alone requisite to use the above means of prevention, as they may severally be possessed by individuals or communities, under circumstances which render the appearance of scurvy either probable or certain; but all the *predisposing and exciting causes* (§ 33, *et seq.*) ought to be carefully avoided, as far as this can be effected. I believe that no mean cause of the prevalence of scurvy in the navy, as well as in trading ships, was the habit, morning and evening, of washing the decks, thereby keeping in a constant state of humidity and evaporation, and the air either cold and humid, or close and humid, according to concomitant circumstances. This evil is partly abated by adopting dry scrubbing and similar means; but it still should be kept in recollection, as the adoption of it depends upon the knowledge or caprice of the captain, who in this, as well as in other matters connected with naval service, may thus occasion an unhealthy state of air, an artificial malaria, the humidity favouring the concentration of emanation from the hold and other parts of the ship, and from the individuals confined during the night in a limited space and in a close air. Harassing duties, fatigue, and whatever lowers the general standard of health, or depresses the vital powers, ought also to be avoided.

71. *I.* Much, as will be seen from the above, depends upon the victualling of ships, especially those which proceed upon long voyages. The sailors should have a sufficient supply of cocoa, tea, coffee, fresh lemon-juice, sugar, or molasses; and while spirituous liquors are allowed in very moderate quantity, and only when wet or fatigued, they should either be withheld, or allowed in very small quantity only, when these exigencies do not exist. In circumstances tending to depress the mind, endeavours should be used to amuse and to excite it, in such ways as may the least tend to be followed by depression. In these respects, as well as in others, the means adopted by Sir E. PARRY deserves both praise and adoption, as far as the latter is possible.*

* [Potato or corn starch, which is now extensively manufactured, ought to enter largely into the dietaries of seamen, especially since it is so prepared and put up that there is no danger of deterioration by age or climate. An abundant supply of potatoes, sliced and dried, was taken out in the late United States Exploring Expedition in search of Sir John Franklin, and answered an admirable purpose in preventing scurvy. Dried apples and peaches should also be supplied in liberal quantities to the navy, and more frequent supplies of fresh meat and vegetables should be furnished, by a more frequent resort to ports where they can be procured. More attention is also needed, in our mercantile and public vessels, to ventilation, the quality of stores, personal cleanliness, and to the abolition of the spirit-ration, which is a constant source of both moral and physical evil. The fore-castle on board our merchantmen is either cold, wet, and uncomfortable, or hot, suffocating, and filthy, with all manner of offensive smells, and no ventilation whatever. Since the recent enactments by Congress in regard to the regulation of emigrant vessels and packet ships, many of the abuses which formerly existed have been done away with; still there is great neglect in enforcing the law; and the consequence is, that typhus fever, dysentery, &c., often prove very fatal

72. VIII. TREATMENT OF SCURVY.—What has already been stated with reference to the *prevention* of scurvy applies equally to the *treatment* of it, especially in its early stages, and less complicated or less severe states. But it is occasionally observed that, owing either to the continued influence of certain causes which are overlooked, or cannot be removed, or to the presence of some complication, the disease resists the usual means of cure, and even those remedies which have generally been efficacious in the most severe cases. *Lime-juice*, and especially fresh lemons and limes, have been found the most efficacious means of cure in pure scurvy; but instances have been recorded very recently in which lime-juice has failed. These instances of failure have, however, been adduced in too general terms, and without a sufficient and precise record of the several circumstances in which the failure occurred, or of the particulars in which the disease varied in its character from that usually observed. The distemper has commonly been stated to have been scurvy arising out of the usual causes; and lime-juice has been said to have been given without benefit; but no particulars are adduced as to the existence or non-existence of one or more of those predisposing and concurring causes described above (§ 33, *et seq.*), as not merely contributing to the production of the malady, but also actually perpetuating, modifying, or aggravating it, if they are allowed to continue in operation during the treatment. When lemons, limes, shaddocks, and oranges can be procured, they are preferable to other means; but otherwise the preserved lime-juice or crystallized citric acid should be substituted. In respect of the preserved juice, we have no adequate information as to the time it will retain its antiscorbutic properties; for it is not unreasonable to infer—indeed it has been proved—that, when this juice has been kept two or three years, as is not infrequently the case, it may have lost much of its virtues, the failure of it under such circumstances being sufficiently evident, without looking for the cause of failure in the nature of the disease itself, or in the inefficacy of the remedy.

73. One of our oldest English writers on scurvy, JOHN WOODALL, in his meritorious work, entitled the "Surgeon's Mate"—a name too vulgar to be noticed by doctors of modern manufacture—observes that "we have many good things that heal the scurvy well on land, but the sea chirurgeon shall do little good at sea with them, neither will they endure. The use of the juice of lemons is a precious medicine, and well tried; being *sound and good*, let it have the chiefe place, for it well deserves it; the use whereof is: it is to be taken each morning, two or three spoonfuls, and fast after it two hours; and if you add one spoonful of *aqua vita* thereto, to a cold stomach, it is the better. Also, if you take a little thereof at night, it is good to mixe therewith sugar, or to take of the syrup thereof is not amisse." This good advice was given in 1636, and farther insisted upon subsequently by MARTIN LISTER, DELLON, and many

on board these vessels. Were the regulations, however, fully carried out with regard to the number of passengers, the quality and quantity of food, ventilation, and cleanliness, these diseases would rarely be observed on board, if, indeed, they ever appeared, except sporadically.]

others; and yet, when Lord Anson proceeded on his circumnavigation, no provision of the kind was made against scurvy; the prevention and cure of disease, and rewards for those who devote themselves to those laudable undertakings, never having been considered of any importance by British governments, or, at least, of very minor importance only; the aggrandizement of party and family connexions always absorbing and utterly annihilating considerations of public justice and patriotism.

74. Since the works of LIND, TROTTER, and BLANE established the reputation of lemon-juice and acidulous fruits for the cure of scurvy, these, with the use of fresh succulent vegetables, have been generally adopted. Nevertheless, other means have been resorted to, owing either to the failure of the lemon-juice, or to the form of, and circumstances attending, the malady. The other vegetable acids, and the mineral acids, have been found very remarkably inferior to the citric in the treatment of scurvy; but the amount of benefit which various kinds of salts, and the alkaline carbonates, are capable of affording, has not been ascertained, excepting in the single instance of nitre. Mr. PATTERSON, a naval surgeon, writing in 1794, showed the good effects of a solution of *nitrate of potash in vinegar*. He advised four ounces of nitre to be dissolved in a quart of vinegar, and gave half an ounce of this solution twice or thrice daily, and bathed the local sores with it as often. He states, that "some patients cannot bear the solution without the addition of water, while others, without the least inconvenience, bear it undiluted. The discharges by stool, or the presence of gripes or nausea, guide me with respect to increasing or diminishing the dose; but, at the same time, it is not a slight degree of nausea, colic, or diarrhœa that renders an alteration in the quantity of the medicine necessary. To a great number of scorbutic patients, eight ounces of this strong solution, containing one ounce of nitre, have, in the course of the day, as long as such a quantity was necessary, been administered to each with the greatest success. Also, large and frequently-repeated doses of this medicine have been given in cases of scorbutic dysentery, and, instead of increasing, I have always found it remove the disease."

75. Mr. CAMERON, another experienced naval surgeon, states, that having on several occasions observed the excellent effects of a solution of nitre, as recommended by Mr. PATTERSON, in scurvy, he was induced to employ it when the disease broke out among the prisoners on board of a convict-ship proceeding to Sydney in December, 1829, under his care. As soon as he commenced the use of this solution, many almost hopeless cases began to improve rapidly, and, before one third of the voyage was accomplished, the health of the sick improved so fast under the new treatment, that he did not think it necessary to go into any port; and the general health of the prisoners (216), when they arrived at Sydney, was much better than when they embarked in Ireland. Some of the cases manifested a severe pulmonary complication, but these also recovered. Mr. CAMERON's preparation consisted of eight ounces of nitre, dissolved in sixty ounces of vinegar. Sometimes equal parts of vinegar and lime-juice were used: a little sugar was generally added, to ren-

der it more palatable, and a few drops of oil of peppermint, and a little alcohol. An ounce of this solution was a dose; and from three to eight doses, according to the stage and severity of the disease, were given at equal intervals, from six in the morning until eight at night.

76. It has been contended by Dr. STEPHENS that the state of the blood in scurvy indicates the exhibition of the non-purgative salts, and not of acids. His own experience appears not to have furnished him with sufficient evidence in this matter. But I may mention that, in states of disease closely allied to scurvy, I have given, from an early period of my practice, the *chlorate of potash*, as well as the *carbonates of soda and potash*, with very marked benefit. In obstinate or complicated cases, or when the above means fail, a combination of these salts—of the nitrate and chlorate of potash, and the carbonate of soda or potash—may be tried; or the *chlorinated solutions of lime or of soda*. When diarrhœa is present, *lime-water* with milk, or small and frequent doses of the *chloride of lime*, or of *creasote*, in any demulcent vehicle, may be of use; and when hæmorrhages are present, small or moderate doses of the *terebinthinates*, or of the *spirits of turpentine** (§ 68, 69), should be exhibited in any suitable form, or on the surface of spruce-beer, when that beverage can be procured.

77. When the disease is complicated with *pleurisy* or with *congestive pneumonia*, the nitre, with lime-juice and camphor, will be found beneficial; and epithems or embrocations applied to the chest or over the seat of pain, consisting of the compound camphor and turpentine liniments, will prove of essential service. When the disease is associated with disease of the *spleen*, as often occurs when it follows *intermittent* or *remittent fevers*, the preparations of cinchona or quinine, of *serpentaria*, *guaiaicum*, &c., have frequently been found of service. In these, as well as in complications with *ague*, the remedies just mentioned should be exhibited in decided or sufficient doses; or various chalybeate preparations may be substituted, or given as circumstances may suggest. If the functions of the *liver* be torpid, or if congestions of this organ or of the spleen be indicated, the *nitro-hydrochloric acids* may be taken in weak solution, as the common drink, and the surface of the trunk, or the lower extremities, sponged or bathed with the tepid or warm solution of these acids. In many circumstances of the disease, the compound decoction of *sarsaparilla*, or other preparations of this medicine, will be taken with advantage; and several of the substances mentioned above (§ 68, *et seq.*) will be beneficially conjoined with others, according as circumstances arise.

78. During the course of scurvy, whether simple or complicated, the *bowels* are often more or less disordered. When *costiveness* occurs, it should be removed by the less irritating but efficient means. The most appropriate and the

* Very recently the spirits of turpentine has been recommended for hæmorrhages, as a new medicine for this class of diseases. I may mention that, in a memoir, with experiments on the use of this remedy in disease, published by me in 1821, in the *London Medical and Physical Journal*, it was strongly advised to be prescribed for all hæmorrhagic affections; and the same advice has been given for these affections, as well as for numerous others, in this work.

most successful is a solution either of the *citrate of magnesia* or of the *phosphate of soda*; or a sufficient quantity of *magnesia*, taken shortly before exhibiting the lemon-juice or the solution of citric acid. In order to keep the bowels sufficiently open, and to procure a return of the functions of the skin, *magnesia* may be taken conjoined with the precipitated *sulphur* and a little powdered ginger, in repeated doses. If *diarrhœa* or *dysentery* supervene, the means already mentioned, or those advised in another place (*see* DYSENTERY, SCORBUTIC), should be employed. If the evacuations be very offensive as well as frequent, lime-water with milk, or the chloride of lime, or powdered charcoal, or tar-water, or creasote, will be found very beneficial; and to either of these the *calamus aromaticus*, or other similar substances, may be added. M. BRACHET states that he has cured several cases of scurvy with powdered carbon alone.

79. As the disease approaches to, or assumes the characters of *putro-adyamic* or *maculated fever*, as observed sometimes under circumstances favouring this occurrence, the remedies advised above (§ 68) for the complication of the distemper with *ague*; and various antiseptics, especially those recommended for the treatment of *putro-adyamic* or *typhoid fevers* (*see* FEVERS, § 585, *et seq.*), should be prescribed with due decision, and appropriately to the features of individual cases. In all the states or complications of scurvy, as in low states of fever, approaching in character to those of scurvy, an *expectant practice* is not only a most dangerous, but a fatal one. The medical journals of the day—the middle of the 19th century—teem with the histories of cases of low fever, in which the practice was either expectant or inappropriate, as far as the treatment is recorded: the *post-mortem* changes revealing the results, which, by the experienced and observing physician, may have generally been anticipated.

80. The *diet* and *regimen* during the course of the malady constitute the chief part of the treatment, and, as such, have been sufficiently noticed, in respect both of the prevention and cure of the malady. A warm, dry, and pure air (avoiding exposure to cold and wet), and moderate mental excitement, amusement, &c., will contribute very remarkably to the removal, as well as to prevention of scurvy.

[The facts stated by our author with regard to the causes and successful treatment of scurvy may perhaps be so generalized, by careful induction, as to lead to a knowledge of the principles involved. It is very evident that the elements of healthy secretion and excretion must be found in sufficient quantity in the food, or that the fluids will deteriorate, and the health suffer. Every part of the body, the bones, the nervous matter, the muscles, the cellular tissue, &c., each must have those elements supplied in the food, which belong to its normal constitution, as lime, phosphorus, sulphur, potash, &c., or disease will be the consequence. In all cases where scurvy has existed, some of these elements have probably been wanting. There must be sufficient protein, oxygen, nitrogen, hydrogen, and carbon for the soft tissues, as well as phosphate of lime for the bones, phosphorus for the brain and nerves, sodium and sulphur for the bile, and iron for the blood, in

order for the due performance of the animal functions. By a process of oxygenation, the various solids and fluids are being constantly thrown off in various forms, as urea, lithic acid, lactic acid, bile, sweat, &c., and they must as constantly be supplied, though the relative quantity may vary with the age and the circumstances in which an individual is placed; more lime and iron, for example, being required in the early periods of life. But the food must supply elements equal to the waste. Now animal food, as well as vegetable seeds, furnish nitrogen in that form which is most easily assimilated; while succulent roots supply the inorganic elements, the alkalies, lime, sulphur, and phosphorus; while the carbonaceous element of the farinaceous substances serves for combustion, and the production of animal heat. Now, under favourable circumstances, it is possible that some of these elements may be wanting in the food, and still the health not appear to suffer; but where other causes co-operate with this, scurvy or some analogous affection is very sure to occur. The constituent wanting may be organic or inorganic. Dr. GARROD has attempted to show that in all scorbutic diets *potash* exists in much smaller quantities than in those which are capable of maintaining health; that all antiscorbutics contain a large amount of potash; that in scurvy the blood as well as urine is deficient in potash; and, lastly, that the disease is effectually cured by the same agent, without making any change in the diet. It is certain that in salt beef and pork, owing to the action of the soda, there is a gradual exosmosis of the potash, and loss of this element; while in milk, fish, potatoes, and in most vegetable juices and fruits, it is very abundant. It also abounds in wine, cider, spruce-beer, wort, the pine, juniper, and spruce, the vegetable acids, and, in fact, in all antiscorbutic articles of food. The *nitrate of potash*, as well as the *bitartrate* and the *oxalate*, have also proved valuable remedies in the disease. The rapidity of the cure will generally be proportioned to the nutritious quality of the food, together with the variety; but in all cases, fresh vegetables, which abound with the salts of potash, are the most beneficial.]

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See *Braithwaite and Ranking's Abstract* for 1848, '49, '50, for several valuable articles on Scurvy.]

SEROUS AND SYNOVIAL MEMBRANES.—

SYN.—*Membranes séreuses*, Fr. *Seröse Häute*, S. *Ueberzüge*, *Wasser-häute*, Ger. *Membranes synoviales*, Fr. *Synovial-kapseln*, *Synovial-häute*, Ger.

CLASSIF.—See art. PERITONEUM, PLEURA, &c.

1. The pathology and diseases of serous and synovial membranes have been so fully considered in the articles PERITONEUM, PLEURA, BRAIN, MEMBRANES OF, that a description of the organic changes presented by these membranes would be only a repetition of what has been already stated under these heads. As respects these changes, whether those consequent upon the several states of inflammation, or those arising from constitutional causes or vice, and altogether independent of inflammation, I believe that they will be found to be more fully described at the places now referred to than any where else. Since these articles were written, the very excellent works of *ROKITANSKY*, and the able treatise of *DR. BRINTON* on the pathology of serous and synovial membranes have appeared; but, after attentively perusing these, I find nothing that requires to be added, at this place, by way of appendix to the articles just enumerated. Indeed, there is one lesion, or rather ultimate change, consequent, in rare instances, upon chronic peritonitis and chronic pleuritis, lately seen by me in these maladies, which is not noticed by either of these writers, viz., the complete degeneration of the greater part of the organized exudation, false membranes, or adhesions produced by these diseases, as well as by chronic inflammation of the serous membrane of the spinal marrow, into fat. This ultimate change, observed by me in these three situations, in old or very chronic cases of these maladies, appeared to be not merely a far-advanced change, but also a reparative one, admitting of a partial return of the functions of the parts adjoining. (See art. PLEURA, § 100.)

2. The contractions, also, produced in cases of chronic inflammation of the peritoneum, described by *DR. HODGKIN* and myself, have also not been mentioned by these writers. (See art. PERITONEUM, § 116.)

3. It is almost unnecessary to state that the organic changes met with in the membranes usually denominated serous occur also in those commonly termed synovial, their intimate structures being alike, although their connexions are different.

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SHOCK, VITAL OR NERVOUS.—SYNON.—

Sudden sinking of Vitality; Vital Depression; Nervous Shock, Nervous Depression, Fatal Sinking, &c.

CLASSIF.—I. CLASS, I. ORDER (Author).

DEFINIT.—*Sudden or instantaneous depression of organic nervous or vital power, often with more or less perturbation of body and mind, passing either into reaction or into fatal sinking, occasioned by the nature, severity, or extent of injury, or by an overwhelming moral calamity.*

1. A shock, whether physical or moral, may present any grade of severity, from merely a slight but sudden depression of the vital functions to the rapid extinction of these functions. From its slighter forms, the powers of life react sooner or later, especially when judiciously aided; but its more intense states are either removed with great difficulty, or they proceed, with various rates of celerity, to a fatal issue; the vital sinking increasing more or less rapidly, and extending from the organs more strictly vital to all other parts—from the seat of injury to the solar ganglion, and thence to the heart, respiratory apparatus, brain, spinal chord, muscles, and senses—until the functions of all are extinguished. *Vital shock* varies, not only in severity and fatal tendency, but also somewhat in its phenomena, according to the constitution and vital energies of the sufferer, and the nature of the cause.

2. Although the effects of shock have been recognised by most observing persons, even by the uneducated, yet they have received extremely little attention from medical men; they have not been noticed, either in medical or in surgical writings, excepting very casually in some surgical works; and I believe that they are now treated of for the first time in a systematic medical work.* It is necessary to distinguish *shock* from *concussion*; for, although concussion, whether of the head or of the spine, is generally attended with more or less of vital shock, still concussion concerns chiefly the functions of either the brain, or spinal chord, or of both, according as the injury is directed to either or both of these quarters. The severity and danger of shock depends not upon the amount of pain produced, but rather upon the suddenness and violence of the injury, relatively to the amount of vital resistance; for when a cannon-

* The diseases of the CÆCUM and its Appendix were fully described, and their treatment pointed out in this work, long before they received any adequate attention elsewhere. Some years afterward papers were published on that subject in the Transactions of the Medical and Chirurgical Society; and the learned author of these papers commenced with the veracious statement that the subject had never engaged the attention of any previous writer, although the comprehensive article on the subject in this work is sufficiently extensive to make a small volume, and it was then in the hands of many thousand readers. It is to be hoped that the present article may receive attention, but not quite similar attention, especially from surgical readers, whom it more especially interests. "*Sic vos non vobis*," &c.

ball, or any other ball, carries off a limb, or does other fatal injury, pain is not produced, but the vital shock is extreme, the general depression, or vital sinking, often passing rapidly to dissolution.

3. Pain of itself rarely occasions, although it may accompany shock, and, when it does, it generally tends to diminish shock, and to develop reaction. Pain and shock are often associated in injuries and surgical operations; but the former is an endowment tending to the protection of life, to the counteraction of the effects of shock, and to the development of a salutary vital reaction. The severest or most prolonged pain does not occasion vital shock, but it causes vital exhaustion, sometimes even sleep. This was proved by the tortures of the rack in former times, and by the history of the most painful affections. When pain attends severe injuries and operations, the patient sinking more or less speedily, the result should be imputed to the influence of the shock on the constitution, and not to the pain, which is merely unavailing in counteracting the fatal result. This view of the subject, I am aware, is very different from what is generally taken; but a more intimate consideration of the phenomena than has hitherto been entertained will show its truth. The importance of this topic is remarkably heightened, at the present day, by the circumstance of anæsthetics being so generally employed during operations, and even during parturition; for, if the view I now take be just, the shock to the constitution, or vital influence, by severe operations, or by a severe labour, will be increased by annihilating the preservative influence of pain; and the immediate as well as the more remote effects of shock will be thereby more or less increased.

4. In the article POISONS, I have shown the effects produced by the *inhalation of chloroform and ether* (§ 615, 616). It may be useful to view these effects in connexion with those produced by dangerous or fatal injuries, and to contrast them as far as they admit of contrast. It will be seen, by observing the progressive effects of chloroform, that it paralyzes sensibility, and subsequently, as its influence extends to the medulla oblongata, it more or less paralyzes the respiratory functions, and ultimately the heart itself, if its inhalation be continued sufficiently long to produce this effect; the functions of the brain, of the medulla oblongata, and of the ganglial system, being successively extinguished. The effects of fatal shock are similar as respects the sinking and extinction of the functions of these several organs, but they present a different order of process, as will be more fully shown hereafter, the ganglial and cerebro-spinal functions being successively affected. Now, as the effects produced by the inhalation of chloroform are depressing as well as anæsthetic, and as shock is also depressing, although in a somewhat different manner, must it not be reasonable to infer that the shock will be more severe and dangerous, *cæteris paribus*, during the influence or effects of chloroform, than when the frame is unaffected by this agent, and when pain exerts its influence, and develops a salutary vital resistance? In this matter the ascertainment of truth is my object. I reason from my own observation, as far as it has extended, and I leave this part of my subject to

those who have had, or may have, a more extensive experience of the phenomena to which these remarks apply.*

5. Shock produces effects of various grades of severity, according to the health, or the states of depression or of excitement the individual may be in at the time of sustaining it. Thus a person of a powerful constitution is much less affected by it than a delicate, nervous, or melancholic individual. A state of excitement, anger, passion, &c., to a certain extent, counteracts its effects, while fear, grief, or any of the depressing passions, increase its effects. Even pre-existing disorder, or structural change, renders these effects more dangerous or severe, especially organic change of the structure, or of the cavities or valves of the heart. These are important circumstances as respects persons for whom severe operations may be required, and should be kept in recollection when such operations are about to be determined on. While the *severity* of shock is thus influenced by constitution, temperament, states of mind, and existing disorder or actual organic disease, the *phenomena* constituting shock are also modified, by these circumstances, in a more or less remarkable manner. The intensity, as well as the modifications of the phenomena of shock, is very remarkably influenced, or even in great measure occasioned, by the state or amount of alarm produced in the mind of the sufferer by the injury causing the shock; this is the more remarkable in severe wounds and other injuries.

6. From these considerations, it will be readily inferred that the *symptoms* or *phenomena* of shock will vary more or less in different cases, according as one or several of these modifying causes are in operation; and that, while certain of them may be wanting in some instances, the whole may be differently grouped, or may appear in varied succession, in most cases.

7. I. PHENOMENA OF SHOCK.—The *symptoms* of shock vary with the severity or intensity, and nature of the *cause*, and the state or constitution of the recipient. The *causes* of shock are chiefly, 1st. Contusions, bruises, blows, and concussions; and these vary in their effects, according to their situation upon or near vital or

* [We believe that *anæsthetics* not only annul pain, but also prevent the shock which the system would otherwise sustain during a severe surgical operation. They produce such an impression on the nervous centres, or so modify their functions, that causes which in a normal condition excite pain, or rapidly exhaust nervous energy, produce comparatively no effect. This may partly be owing to their influence on the mind, removing all fear and mental alarm; but it is not wholly due to this cause. In order that shock should be felt, the functions of the nervous system must be in a normal state, or the seminal powers active. If a limb, for example, be amputated, or an extensive burn be inflicted during deep intoxication, from any cause, no shock will be experienced, any more than pain. We lately had an opportunity of observing this in a man who had both feet burned off during a state of intoxication. There were no apparent symptoms of shock whatever. So, also, the statistics of capital operations, both in European and American hospitals, show that the average mortality from shock, occasioned by such operations, has been greatly diminished since the introduction of anæsthetics into surgical practice. Their pre-eminent value consists, indeed, in their preventing shock. If they have this effect, and that they do is sufficiently proved by facts of daily occurrence, even granting that the effects of chloroform are temporarily depressing, the danger of a fatal result is not enhanced, but greatly diminished by its use. Pain, within certain limits, may be conservative; beyond these it rapidly exhausts nervous energy and the vital force, and co-operates with shock in inducing a fatal result.]

important organs, as when they are seated over or near the epigastrium, the cranium or neck, the joints, the spine, &c. 2d. Gun-shot wounds, by which large nerves, blood-vessels, or important viscera, or joints, or large bones, are more or less injured. 3d. Penetrating or incised wounds, or surgical operations, implicating these or other parts. 4th. Simple or compound fractures, dislocations, lacerations, or lacerated injuries of all kinds; and, 5th. Mental alarm or terror, or shocks from the sudden or unexpected intelligence of losses of near relations, of friends, of wealth, of honour, or of worldly consideration, or intense fear or dread of some calamity. In many of the preceding classes of causes of shock, mental alarm or dread—the mental shock—greatly increases the effects of the physical shock upon the vitality of the frame, and especially on the manifestations of life in the nervous system; so that, in estimating the amount of the latter, care should be taken not to overlook the existence and intensity of the former—of the mental alarm or shock.

8. Now, although these several classes of injury, with their frequent attendant, mental alarm or shock, may be supposed to produce varied effects, yet such is not always the case; for so much may be owing to the severity, as well as the nature of the cause, relatively to the state and constitution of the sufferer, that the phenomena consequent upon the one class may hardly vary from those following the others. So much, however, is often observed to depend upon the viscera and parts injured, and upon the loss of blood, and the amount of that loss, as well as upon the intensity of mental alarm, as to render it necessary to connect the shock and its intensity with the nature and severity of the cause or causes which produced it. For, according to the cause, (1st) the shock may be altogether and simply a vital one, as when it is produced by a violent blow on the epigastrium, occasioning concussion of the solar ganglion; (2d) or it may be associated with various nervous phenomena, as when a large nerve, or joint, or limb, is lacerated or severely injured, and the patient thereby greatly alarmed; (3d) or it may be complicated with, or rather characterized by, comatose sinking, as when the contusion, concussion, or blow effects the intimate organization and circulation of the brain; (4th) or it may be so associated with the sinking, consequent upon losses of blood, as not to be distinguished from this cause, especially when the injury is such as occasions both shock and hæmorrhage; or (5th) the alarm or shock may be entirely a mental one, or that consisting entirely of the sudden effects of extremely depressing emotions on the action of the heart, or of the sudden and unexpected intelligence of distressing losses or events, whereby the nervous system is more or less shocked, the mental manifestations disturbed, and the functions of the heart and vital organs depressed and otherwise disordered.

9. It will thus be perceived that the injuries or causes occasioning shock may be divided into *five classes*, and that the effects they produce may present *five modified forms*; but, although either of these may result from either class of causes, and although it is necessary to connect our observation of the phenomena, and our

treatment of shock, with the particular cause of it, it is still more important, especially as regards the treatment, to mark the particular form and modification requiring our aid.

10. (a) The *simple* or more *vital states* of shock may be so slight as to pass off in a few hours, or so severe as to terminate fatally in a few minutes, according to the intensity of the cause. This effect may be altogether independent of any hæmorrhage, and may result from a variety of causes. A violent blow or confusion over or near the epigastric centre may so paralyze the heart as to produce more or less sinking, not only of the action of this organ, but of all the vital functions; the *symptoms* being chiefly feebleness, slowness, or irregularity of the pulse; coldness and pallor of the face, general surface, and extremities; a distressing feeling of sinking and anxiety; slow or irregular respiration; sometimes cold perspiration, with general tremour; and a sunken or collapsed state of the countenance, terminating, more or less rapidly, in loss of pulse at the extremities and in the carotids, and in extinction of sensation, of the heart's action, and of respiration. In some cases, especially when the injury is less intense, or when a large joint is very severely injured or crushed, these symptoms may not be so intense, may be of longer duration, and be attended by others, as vomiting, singultus, or by restlessness, by feelings of alarm and anxiety at the epigastrium; and, according to the nature and severity of the cause, relatively to the state of the sufferer, these symptoms may lapse into fatal sinking, or be followed by imperfect efforts at reaction, or by delirium, or by reaction, terminating ultimately either in coma and death, or in recovery, according to the constitution of the patient and the treatment adopted.

11. (b) With more or less of the above symptoms, others may supervene, or may be present from the first, more especially when a limb is carried away by a cannon-ball, or when it is lacerated extensively, or near to the trunk of the body, or when large blood-vessels or nerves are lacerated, or large joints are crushed. In these circumstances, as well as in others, especially in nervous and irritable temperaments, various *nervous symptoms*, especially mental alarm and restlessness; irregularity of the heart's action and of respiration; a terrified, as well as a sunk state of the countenance; delirium, terror, and incoherence; a general tremour and coldness; a remarkable and peculiar tremour or quivering of the injured limb, with a cold, wet, pallid, or leaden state of the surface of the limb, or parts adjoining, are more or less remarkable, and seldom terminate in a salutary reaction, unless in a few cases which admit of surgical interference by amputation, &c. When severe injuries are inflicted upon any part of the abdominal cavity, a state of stupor or apathy, yellowness of the surface of the body, collapsed features, and fatal sinking, as already described (§ 10), either appear from the first, or supervene upon the symptoms just enumerated. In most of these severe injuries, and especially those produced by fire-arms, the amount of pain is very small compared with the intensity of the shock; and even where the shock is the greatest, the pain may be the least, or may even be entirely absent. Indeed, in many cases, the pain precedes the occurrence

of reaction, and even favours the development of this salutary effort of nature.

12. Although surgeons have neglected to treat specifically of *shock*—a state which particularly concerns them, as respects both the period and the prudence of operating, and the effects of operations—the subject has been briefly adverted to by many, and especially by LARREY, GUTHRIE, COPLAND HUTCHISON, DUPUYTREN, and HENNEN. It falls not within the scope of this work to notice the remarks they have offered respecting it; but what they have advanced, which is extremely little, will be readily found in the works of these celebrated surgeons.

13. (c) Injuries may be received directly or indirectly by the brain or spinal marrow, so as to produce a form of shock, which has been generally termed *concussion of the brain*, or of the *spinal chord*, as either may be affected. In such cases, with more or less shock to vitality or to the frame, there is a special shock sustained by these nervous centres, the minute or ultimate organization and circulation of these parts being so changed or affected as to instantly arrest all the functions they perform. With the phenomena of shock, as manifested in its more simple form (§ 10), unconscious fæcal and urinary evacuations, sometimes with vomitings, are also present. When the injury thus implicates the brain, or upper portion of the spinal chord, the annihilation of the functions of those parts especially distinguishes the case, although the marked and often rapid sinking of the heart's action, or the paralysis of the respiratory muscles, farther characterizes it, either of these being the more immediate cause of dissolution.

14. (d) Cases often occur in which the shock is heightened by, or complicated with, either *internal*, or *concealed*, or *open hæmorrhage*. In these the symptoms of simple shock (§ 10) are more or less manifest, with great pallor of the surface, often with coldness and tremour, sometimes with successions, or shudderings, or vomitings, passing into deliquium, or fatal sinking, especially when attempting to sit up. The action of the heart then ceases, and with it respiration; the cerebral functions either being but slightly disturbed, unless shortly before death, or ceasing in a way not to be distinguished from the accession of sleep, excepting in the rapid failure of the pulse and respiration. In the less severe cases of this kind, reaction may supervene, and recovery take place, when the nature of the injury causing the shock and hæmorrhage, and the consequences of both, admit of this issue.

15. (e) The *fifth form* of shock depends more or less on mental causes of an intensely depressing nature. The physical effect may be entirely owing to the mental cause, or partly owing to this cause, or to alarm or dread of dissolution in connexion with a physical cause, as in cases of gun-shot or other wounds, severe injuries, operations, &c. In these latter cases, the causes are both physical and mental; and the phenomena present a mixed character, more or less of mental alarm or of nervous phenomena, such as are above noticed (§ 11), being associated with physical depression—the symptoms of either the *first* or the *second* of these forms predominating with fright, anxiety, or most manifest alarm and distress, or of absolute ter-

ror, or even delirium, sometimes, in females, with hysterical convulsions, prolonged faintness or catalepsy. In this form of shock, the strength of mind, the nervous energy, or force of character of the sufferer, modifies remarkably the amount or intensity, as well as the particular form or state, of the physical effect; for the same intensity of cause, which might make but slight impression on a person thus mentally constituted, or on one physically robust, might produce a very dangerous effect on a delicate, nervous, and susceptible individual; this effect being, moreover, often attended by faintness, convulsions, incoherence, &c. Mental shock is more especially depressing and dangerous to persons who are the subject of organic diseases of the heart or brain—of the former particularly—death often immediately following it.

16. II. The *DIAGNOSIS* and *PROGNOSIS* of *SHOCK* require but little remark.—A. Of the *former* it may be observed, that it is often difficult to determine whether or no a fatal result be owing to the immediate physical shock and mental alarm which an injury or operation produces, or to the consecutive effects on the frame, either by interrupting some important or vital function, or by contaminating the blood. True or simple shock is always instantly manifested on the cause producing it; it is generally attended by nearly all the symptoms already enumerated, by more or less mental alarm, and by a sensation of sinking and anxiety referred to the epigastrium and præcordia, sometimes with vomitings, characterized by slight or even no effort, or with unconscious or involuntary evacuations, and a universal failure of all the vital functions. In some of the most severe cases of physical shock, instead of mental alarm, there is either delirium, or stupor, or apathy.

17. B. The *Prognosis* depends entirely upon the nature of the cause or injury, and the intensity of the effect indicated by the symptoms. Great slowness or weakness of the pulse; or great frequency, with feebleness or irregularity; marked coldness, pallor or leaden hue of the surface; tremour, cold perspirations, vomitings, singultus; irregularity of the respiration; continual restlessness; a sensation of sinking or of impending dissolution; delirium, apathy, or stupor; involuntary evacuations; a jaundiced appearance of the surface; rapid failure of the pulse, &c., are all very dangerous, and often fatal symptoms. When the phenomena are less severe, and when the means employed are successful in bringing about a salutary reaction, or even in diminishing the severity of those now mentioned, then hopes of a recovery may be entertained. But so much depends upon the nature and peculiarities of the case, upon the patient's feelings and opinions as to the issue, which should always be duly considered, and upon the progress and contingencies of the after-treatment, especially for complicated injuries, as hardly to admit of definite laws of prognosis being assigned.

18. Many of the injuries which occasion severe shock involve the questions, 1st, as to the propriety of amputating a limb, or shattered or torn stump; and, 2d, as to the period at which this operation should be performed. The first of these questions has been satisfactorily considered by surgical writers; but the second has been long a subject of discussion, many writers

of experience taking different views of the matter. The differences of opinion, as well as of success, as regards the period, after these injuries, at which the operation should be performed, have arisen from the want of due attention to the existence or non-existence of the more marked phenomena of shock at the time of performing the operation, and from recourse having been too frequently had to it before these phenomena had subsided, or before the frame had recovered itself, either partially or more fully, from the shock it had experienced—before vital reaction had commenced; for, if a few hours be not allowed for this purpose before the operation be attempted, the performance of it so rapidly upon the receipt of the injury may convert a state of shock, admitting of vital reaction, into a state of fatal sinking; or, if the vital energies continue to sink more and more, during the few hours thus allowed for them to rally, notwithstanding a recourse to rational means to this end, an operation will only add to the patient's suffering, and accelerate the fatal issue.

19. III. TREATMENT OF SHOCK. — *The treatment of the more simple states of physical shock* (§ 10) should be appropriate to the intensity or apparent danger of the symptoms. In the *slighter forms*, warm diluents, the application of external warmth, the allaying of mental alarm, a cheerful confidence evinced by the attendants, and a moderate recourse to gentle stimuli or restoratives, such as camphor, ammonia, ether, &c., in small doses, are generally all that may be required. But, in *severe or dangerous cases*, a more assiduous and a more liberal recourse to these means is absolutely necessary, and should be continued until indications of commencing reaction appear. In these, as well as in others of more imminent danger, even an assiduous and a decided use of these means may be insufficient to bring about the desired effect; and others must be brought to their aid. In these cases, more especially, the existence of mental alarm should be taken into account, and where it is inferred—for it may exist without being made apparent—the patient should be assured and encouraged. In all cases of a severe and dangerous nature, and where the occasion admits of having recourse to the means, the patient should be placed in a bed previously well warmed, and two young persons, according to the sex which may be proper, ought to be placed close to him, one on each side, without any intervening covering; and warmth should be promoted by sufficient bed-clothes. In some countries, it has been customary to apply animal heat in a different way, namely, by the skins of animals, torn from their bodies instantly on their being killed, and the internal surfaces applied directly to the patient's body, or even the opened bodies of the animals themselves, while still warm. I have seen these means employed, and certainly with greater success than I expected. In cases of shock from blows or contusions on the abdomen, or near the epigastrium, these means are appropriate, and their success admits of rational explanation.

20. In some cases, a stimulating or medicated warm bath may be tried, salt, mustard, &c., having been added to the water. I do not, however, consider these as efficacious as animal warmth applied in either of the ways just men-

tioned; and I have generally preferred to warm baths, as being more efficacious, more immediate, and attended with less trouble and fatigue, or exertion, on the part of the patient, the application of flannels, wrung as dry as possible out of very warm water, then freely sprinkled with spirits of turpentine, and instantly applied over the epigastrium and whole abdomen, evaporation from them being prevented by dry cloths or oil-skin placed over them. These hot epithems should be continued or renewed until reaction commences, when they, as well as the internal means had recourse to, ought to be discontinued, and the case subsequently treated according to its peculiar requirements.

21. In those cases which present, from the nature of the injury, more or less of the nervous symptoms above noticed (§ 11), various nerve remedies, in addition to those already mentioned, may be employed. In these more especially, and sometimes in others, opium, in certain states of combination particularly, is often of service. In conjunction with camphor, or with ether, or with ammonia and aromatics, it is a most valuable remedy. When delirium is present, camphor is required in full doses; while the addition of opium, or of morphia, soothes the irritability, and allays the restlessness sometimes present, and diminishes the mental alarm. But when delirium occurs, its passage into coma should be dreaded, and opium and other narcotics should be used with caution, and only in combination with camphor and other restoratives and antispasmodics.

22. When the hæmorrhage caused by injuries is so great as to increase the vital sinking attendant on shock, and especially when it increases the alarm of the patient, means appropriate to the circumstances of the case should be taken to arrest it. Prolonged faintness, coldness of the surface, and slowness or irregularity of the pulse, require a decided use of the means already mentioned (§ 19, *et seq.*), aided by the exhibition of ammonia, wine, warm, strong coffee, the horizontal position, and the external application of warmth, as already advised (§ 20). If vomitings accompany this or other states of shock, the hot epithems prescribed above should be assiduously employed, and especially if convulsions or spasms of any part be complained of. Effervescent draughts, with the ammonia in excess, with opium, camphor, ether, &c., may also be given, or pills containing creasote, opium, and aromatics.

23. The terror and mental alarm, often increasing the physical shock in most cases of severe injury, should be combated by the confidence and encouragement of the medical attendants, by a recourse to opium, ammonia, ether, mulled wine, &c. The states of mental shock, produced by sudden and alarming moral causes, may occasion so severe physical effects as to require similar means to those already advised. Faintness, more or less prolonged or repeated, or hysterical convulsions, or spasms, or delirium, may complicate the physical depression, and require the exhibition of diffusive stimulants, conjoined with antispasmodics and anodynes. In cases of general shock, from concussion of the brain or spine, the internal use of stimuli may not be required, and it should at all times be administered with caution. The turpentine epithem (§ 20) may, however, be applied

along the spine, when it is the special seat of shock, or even around the cranium, when the concussion implicates the brain, and an enema may be administered containing asafetida, with a moderate quantity of camphor. But a recourse to these or other means should depend much upon the states of the pulse, and of the sensorium, at the time.

24. The external or local means must be left to the judgment of the medical attendant. Cold applications ought not to be made to the seat of injury, as long as coldness of the surface, collapse of the features, and failure of the pulse exist. They will not only aggravate these symptoms, but also increase the anxiety, sinking, and pain at the epigastrium, and the general restlessness and distress. Warm fomentations, with a decoction of poppy-heads, especially if much pain be experienced, or warm embrocations containing some preparation of opium, will generally afford some relief.

25. The injury, especially those produced by gun-shots, severe compound fractures, lacerations, &c., may require the removal of the limb. In this case, if the phenomena of shock produced by the injury be severe, this operation should not be performed until the constitution shows indications of rallying, either by the efforts of nature—owing to the vital resistance in less severe cases—or by the means above recommended. A few hours should be allowed for this purpose—often not more than two or three—seldom more than eight or ten hours; for if, at the termination of this longer time, reaction has not commenced, and more especially if the vital depression has increased, the additional shock produced by the operation may rapidly terminate life. It will be better, therefore, to persevere somewhat longer in the use of the means advised for rallying the powers of life, and to increase the doses of these means, always with due reference to the previous habits of the patient, than to attempt an operation which will be of no avail.

26. As soon as indications of *vital restoration* or of *vascular reaction* appear, the means resorted to for attaining this end should be relinquished; and gentle diaphoretics be given with the view of equalizing the circulation and removing internal congestions, which are apt to occur during the vital depression caused by the shock. If the reaction be such as is attended by heat and dryness of skin, full or strong pulse, thirst, &c., cooling diaphoretics, purgatives, and even blood-letting, especially if the previous loss of blood has been inconsiderable, should be prescribed; and these should be aided by such local means, in cases of severe injury, as their nature may require.

27. The reaction following mental shocks, especially in nervous, susceptible, and delicate persons and females, is apt to be followed by *delirium* or *fever*, sometimes by *phrenitis* and inflammation of the brain or its membranes, on either of which *coma* is liable to supervene, and similar consequences may follow concussions of the brain or spinal marrow; in such circumstances, the treatment recommended for these diseases, under their respective heads, should be adopted. (See articles BRAIN and its MEMBRANES, INFLAMMATIONS of; also DELIRIUM, COMA, &c.)

28. In some instances, instead of either a

salutary reaction, or increased or inflammatory action of the nervous centres, or their membranes, the shock, whether mental or physical, degenerates into a low, incoherent, or muttering *delirium*, passing more or less rapidly into *coma* (§ 27). In these circumstances recovery rarely takes place; but, nevertheless, a strenuous recourse to the restorative means already mentioned, such as frequent doses of camphor or ammonia, terebinthinate epithems on the scalp and epigastrium, stimulating enemata, &c., should not be neglected. (See arts. DELIRIUM and COMA.)

BIBLIOG. AND REFER.—I am not acquainted with any work or treatise on vital or nervous Shock, and but few writers notice it incidentally, far less describe it, or advise a treatment suitable to its several states. I have treated of Shock in this work, because I consider it a most important and dangerous affection, implicating more or less the whole vital and animal functions, and hence coming strictly within the province of the physician, as well as within that of the surgeon. When we consider that, of the numerous accidents and wounds which cause death, the greater proportion produce this effect by the severity and suddenness of the shock to the vitality of the frame, rather than by any interruption to the functions of the injured part, the interest of this subject will appear in its true light. The principal works in which it is incidentally mentioned are the following: *Larrey*, Mém. de Chirurg. Militaire, 4 tomes, 8vo. Paris, 1812–1817.—*G. Guthrie*, On Gun-shot Wounds of the Extremities, 3d ed., 8vo. London, 1827; and on Wounds and Injuries of the Abdomen and Pelvis, 8vo. London, 1847.—*J. Hennen*, Principles of Military Surgery, 2d ed., 8vo. Edin., 1820.—*A. Copland Hutchison*, Practical Observations in Surgery, 2d ed., 8vo, 1826; and Observations on the Period for Amputating in Gun-shot Wounds, 8vo. London, 1817.—*Dupuytren*, Leçons Orales de Chirurg. Clin., t. ii., art. 7; t. iv., art. 7, et 14.—*S. Cooper*, Surgical Dictionary, 7th ed., 8vo. Lond., 1838, p. 630.

SKIN.—SYNON.—*Integuments*; *Integumental Sae*, or *envelope of the frame*; *Cutis*, *Corium*, *Dermis*; *die Haut*, *das Fell*, Germ. *Peau*, Fr.

CLASSIF.—GENERAL AND SPECIAL PATHOLOGY—SYMPTOMATOLOGY.

1. I. FUNCTIONAL ALTERATIONS.—The *skin*, or integumental sack or covering of the body, discharges more important functions than have commonly been imputed to it. I long ago, and more recently in various parts of this work, endeavoured to prove that the skin performs offices of a very high order in the economy; that through it effete and excrementitious matters are carried out of the blood, and that in this respect, as a depurating organ, it aids the functions of the kidneys, of the large bowels, and of the lungs; an impairment of the functions of either of these being often attended by a vicarious increase of its actions. It is thus an eliminating organ, contributing to the depuration of the blood, generally to an extent more or less intimately related to the amount of function performed by the other emunctories. That the skin performs a vital action, consisting of an insensible and a sensible exhalation, the amount of either depending much upon the state of the atmosphere, is generally admitted. Increased transpiration may proceed from a variety of causes, and so may diminished transpiration; and either, in its more manifest states, is an important indication of disorder. The insensible perspiration may become sensible, owing only to a mild, warm, or humid state of the air; while the perspiration may not only be insensible, but this state of it may be much increased, by more or less evaporation of the fluid in the skin by great dryness of the air.

2. A. When the halitus, or transpiration of

the skin, exceeds the evaporation of it in the atmosphere, sweat is formed; but, in addition to the substances contained in the perspiration, carbonic acid is also given out by it. In healthy persons, the skin exhales carbonic acid, nitrogen, and a watery fluid containing small quantities of the following substances: 1st. Matters soluble in ether: traces of fat, sometimes including butyric acid. 2d. Substances soluble in alcohol: alcoholic extract, free lactic and acetic acids, chloride of sodium, lactates and acetates of potash and soda, lactate or hydrochlorate of ammonia. 3d. Substances soluble in water: watery extract, phosphate of lime, and an alkaline sulphate. 4th. Substances insoluble in water: desquamated epithelium, and phosphate of lime with a little peroxyde of iron.

3. Carbonic acid and nitrogen gases are exhaled in constant but in varying proportions. COLLARD DE MARTIGNY states, that they are exhaled in the greatest quantities after meals and violent exertion; and that vegetable food causes an excess of carbonic acid, and an animal diet an excess of nitrogen. It may be regarded, with EDWARDS, that the physical exhalation of the skin is pure water and these gases; and that the organic function of the skin is the elimination of the above substances (§ 2). The proportion and amount of these matters vary much in different races of men. From several experiments, made many years ago on the negro, I found that the gaseous exhalation from the skin, as well as the solid matters contained in the perspiration, especially the former, was much greater in this than in the white race; and that the function of the skin in the former was more decidedly supplementary of that of respiration than in the latter. Indeed, the cutaneous function of the negro race is of a much more decidedly eliminating nature than that of the white race.

4. Besides the perspiration, the skin furnishes, by means of its sebaceous glands or follicles, a substance consisting of stearin, albumen, extractive matter with olein, phosphate of lime, &c.

5. The eliminating function of the skin is suppressed or interrupted in many diseases, especially in inflammations, until suppuration commences, in the early stage of fevers, in scurvy, in diabetes, &c.; while it is more or less augmented in the sweating stage of agues, in some adynamic forms of fever, in pestilential cholera, in acute rheumatism, in the advanced stages of tubercular consumption, in internal abscesses, and in other colliquative maladies.

6. B. The perspiration may be variously changed in *quality* in several diseases, owing to the contamination of the blood by some specific animal poison, or by the combinations of elements or materials which are usually, in health, eliminated from the blood by the several excretories, and which, when either of these excretories become impaired in function, accumulate in the blood, and are evacuated, in different combinations or states, in the cutaneous exhalations. Thus the sweat of rheumatic and gouty persons is generally acid, while in putrid adynamic fever, and in scurvy, it has a putrid odour. The perspiration of persons affected with itch is said to emit a mouldy odour, and that of syphilitic patients has a sweet smell. STARK states, that the sweat of scrofulous per-

sons resembles the odour of sour beer. The perspiration of persons labouring under small-pox or measles, or pestilential cholera, or scarlet fever, is often so peculiar in each of these maladies as to lead to the recognition of the disease by its scent alone. On entering a house in which cholera was present, I have recognised the malady by the odour of the effluvia from the patient before I have seen him. The sweat is not only abundant, but often presents a urinous odour, in suppressions of urine, or other obstructions of the urinary organs.

7. The *lactic acid*, which is the usual free acid of the perspiration, is generally much increased in acute rheumatism and gout, especially the former. DR. PROUT found free *acetic acid* in the sweat of a person in hectic fever. STARK says, that the lactic acid is increased in the perspiration during scrofula, rickets, and various cutaneous eruptions; and both it and acetic acid exist in the sweat of females during their confinements, and even during suckling. The putrid sweat in adynamic fevers probably contains *ammonia*. The *saline ingredients* of the perspiration may be much increased. DR. PROUT observed the skin of a man in dropsy covered with a white crust of chloride of sodium after an abundant sweat. In cases of gout, of urinary concretions and urinary obstructions, the quantity of phosphate of lime, and of other salts, is more or less augmented.

8. C. The foregoing consists only of an increase of the *normal constituents* of the perspiration; but *abnormal constituents* may be present. ANSELMINO and STARK assert, that *albumen* may exist in the sweat in rheumatic fever, in putrid, gastric, and hectic diseases. *Blood* has been seen in the perspiration in scurvy, and in putrid and yellow fevers. *Uric acid* and *urate of soda* have been found in the sweat of persons suffering from gout and urinary calculi. *Bilin* and *biliphain* have been found in the perspiration of jaundiced persons, and sometimes in those labouring under low, bilious, remittent fevers. This secretion has, in rare instances, been seen variously coloured, owing to the existence of certain colouring matters, as cyanurin, &c. *Fat* has been found in the sweat in some colliquative maladies.

9. Various *substances, foreign to the economy*, may have been taken into the body and appear in the perspiration, especially sulphur, mercury, iodine and its combinations, indigo, saffron, asafetida, camphor, &c. But as regards these and various other substances which are carried into the circulation, and eliminated from it by the excretories, it is difficult to determine, unless by well-planned experiments, how much of this elimination is performed by the skin, or by the pulmonary exhalation, or by the kidneys.

10. II. ALTERATIONS OF APPEARANCE AND STRUCTURE.—i. The *temperature* of the skin varies much in disease, and somewhat in different constitutions and temperaments. It is generally *below* the healthy standard in scurvy, in some states of chronic rheumatism, in paralysis, especially in anæsthetic paralysis, and in pestilential cholera most remarkably. The temperature is very much *increased* in the early stages of most fevers, especially in those characterized by augmented vascular action, and when transpiration from the skin is much diminished or altogether suppressed. In these



